المملكة العربية السعودية
وزارة التعليم العالي
جامعة أم القرى

04/04/1442

Quality Guide for the Department of Industrial Engineering

Faculty of Engineering at the University Branch in Al-Qunfudha Governorate

1443 - 1442 Hijri

يعتمد/وكيل كلية الهندسة بالقنفذة للتطوير
والجودة

الدكتور/نايف بن ابراهيم الحربي

نايف الحربي
وكيل التطوير
والجودة

04/04/1442


بسم الله الرحمن الرحيم

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. مقدمة

الحمد لله رب العالمين، والصلاة والسلام على خير الأنبياء والمرسلين، سيدنا محمد، وعلى آله الطيبين الطاهرين، وصحابته الغر الميامين، ومن تبعهم بإحسان إلى يوم الدين.

إن مسيرة كلية الهندسة بالقنفذة نحو الريادة متواصلة، وتمضي على خطى ثابتة من خلال تقديم جودة تعليم عالية، وكذلك المساهمة في نشر المعرفة للمجتمع من خلال الأبحاث العلمية التطبيقية وخدمة المجتمع.

إن ما تم إنجازه في كلية الهندسة بالقنفذة خلال هذا العام من التواصل المستمر لتحسين وتطوير البيئة التعليمية والبنية التحتية للكلية من قاعات ومعامل ومرافق، إنما هو نتيجة تكاتف كلٍ من إدارة الجامعة ممثلة في معالي مدير الجامعة، وكلية الهندسة بجميع كوادرها من أعضاء هيئة تدريس وإداريين وفنيين وطلبة.

ففي عام 1436 /1437هـ، تم اعتماد الخطط الدراسية لقسمي هندسة التشييد والهندسة الصناعية، كما بدأت الكلية العمل بتنفيذ آليات الاعتماد الأكاديمي ومتطلباته، وذلك تمهيداً للحصول على الاعتماد الأكاديمي الدولي لقسم هندسة التشييد، كما شهدت الكلية احتضان العديد من الفعاليات والأنشطة، كما تم الانتهاء من تجهيز معامل قسم الهندسة الصناعية بأحدث التقنيات التي كان لها الأثر الكبير في جودة وإثراء العملية التعليمية.

إن التحديات التي تواجه كلية الهندسة بالقنفذة كبيرة، ولكن بحول الله وقوته، ثم عزيمة منسوبي الكلية ممثلة في عمادة الكلية وأقسامها وأعضاء هيئة التدريس فيها، والإرادة على مواجهة الصعوبات والتحديات بدعم من ولاة الأمر وتوجيه قيادات الجامعة، وعلى رأسهم معالي الأستاذ الدكتور عبد الله بن عمر بافيل، لتكون كلية الهندسة بالقنفذة واحدة من الكليات الرائدة والمميزة في مجال الهندسة على المستوى الوطني والإقليمي.

عميد كلية الهندسة بالقنفذة

د. علوي بن محمد بامهدي

. لمحة تاريخية عن الكلية

تأسست كلية الهندسة بفرع جامعة أم القرى بمحافظة القنفذة عام 1432هـ، برؤية حكيمة من ولاة الأمر، وبأمر سام من لدن خادم الحرمين الشريفين بهدف تخريج مهندسين من ذوي الدراية العلمية والمهارات العملية العالية في تخصصات هندسية مطلوبة لسوق العمل السعودي والإقليمي.

تهدف الكلية لإعطاء درجة البكالوريوس في التخصصات التالية: هندسة التشييد، الهندسة الصناعية، هندسة الإلكترونيات والاتصالات، وهندسة البيئة.

وقد بدأت الدراسة الفعلية في تخصص هندسة التشييد في الكلية في العام الجامعي 1433هـ. فيما بدأت الدراسة الفعلية في تخصص الهندسة الصناعية في الكلية في العام الجامعي 1434 هـ.

وتم تجهيز الكلية بأحدث التجهيزات المعملية والوسائل التعليمية، وكذلك تم بناء الخطط الدراسية للأقسام الأكاديمية بالكلية وفقاً لـ:

- التطورات التكنولوجية العالمية الحديثة واحتياجات سوق العمل.
- معايير هيئة الاعتماد الأكاديمي الأمريكية للتخصصات الهندسية والتقنية.(ABET)
- معايير الهيئة الوطنية للتقويم والاعتماد الأكاديمي السعودية.(NCAAA)

بحيث تتيح التجهيزات والخطط الدراسية للخريجين فرصة الحصول على تعليم عالي المستوى يمكنهم من المنافسة في سوق العمل المحلي والإقليمي، كما يمكنهم من متابعة دراستهم العليا في الجامعات العالمية المرموقة.

وكذلك تهدف الخطط الدراسية لتمكين خريجي هذه الكلية من اجتياز الاختبارات المهنية للمهندسين مثل FE و PE

. رؤية الكلية:

كلية متميزة في مجال التعليم الهندسي وخدمة المجتمع على المستوى المحلي.

4. رسالة الكلية:

تقديم مستوى عالٍ من التعليم والتدريب الهندسي، وتقديم الخدمات الممكنة لمنفعة المجتمع.

5. القيم:

1. "محمد الرسالة السماوية الخالدة واللغة العربية"، اعتقاد وتراث نحافظ عليها.
2. منهج إسلامي لاستقرار وتقارب الأمم وخدمة البشرية في عصر العولمة.
3. الجودة النوعية الشاملة هي الخيار الأول وأساس التنمية المستدامة.
4. تبني منهج التعليم المستمر.
5. الالتزام بخدمة المجتمع، وتحمل مسؤولية الوفاء باحتياجاته.
6. التعاون والتواصل مع الهيئات الحكومية والجامعات الوطنية والعالمية والقطاع الخاص.
7. الالتزام بتهيئة أفضل بيئة تعليمية لتعليم وتدريب الطلاب على البحث العلمي.
8. تنمية المهارات والقدرات، واستكشاف ودعم الموهوبين وذوي الاحتياجات الخاصة.
9. الالتزام بتحمل المسؤولية تجاه المجتمع، والمساهمة بتقديم أفضل الخدمات المساندة لمكة المكرمة والمشاعر المقدسة والقادمين عليها.

. أهداف الكلية:

لترجمة رسالة الكلية إلى واقع ملموس تحرص الكلية على تحقيق الأهداف التالية:

- إعداد مهندسين ذوي كفاءة عالية في مختلف الحقول الهندسية، قادرين على تلبية احتياجات سوق العمل في مؤسسات الدولة وقطاعات الصناعة، ومتابعة دراساتهم العليا، والتكيف مع تطور التقنيات من أجل مواكبة الحاجات الإنسانية والعلوم الهندسية المعاصرة.
- توفير التعليم المستمر للمجتمع، ونشر المعرفة الهندسية في القطاعات العامة والخاصة من خلال الدورات القصيرة وورش العمل والمؤتمرات، وتقديم الاستشارات والمحاضرات.
- إجراء البحوث العلمية من أجل نشر المعرفة في مختلف الحقول الهندسية والعلمية، وإيجاد حلول هندسية للمشاكل التي تواجهها القطاعات العامة والخاصة.

. قسم الهندسة الصناعية

نبذة عن القسم:

بدأت الدراسة بقسم الهندسة الصناعية في العام الدراسي 1434هـ، 2013م. والهدف الرئيسي من افتتاح تخصص الهندسة الصناعية بكلية الهندسة بفرع القنفذة هو إتاحة الفرصة لأبناء هذه المنطقة والمناطق المحيطة للالتحاق بتخصص حديث في الهندسة. كذلك فإن ما تتمتع به هذه المنطقة من نمو صناعي سيساعد على إيجاد فرص العمل السريعة لخريجي هذا التخصص.

يعمل هذا التخصص على تخريج مهندسين صناعيين متخصصين قادرين على العمل في عدة مجالات ومنها:

1. التصميم والتصنيع الهندسي.
2. الإدارة والنظم الهندسية الصناعية.
3. هندسة الصيانة.

وتُعرَّف مهنة الهندسة الصناعية وفقاً لمعهد المهندسين الصناعيين (Institute of Industrial Engineers) بأنها: "تلك المهنة التي تهتم بتصميم وتطوير وإنشاء الأنظمة المتكاملة من الأفراد والمواد والمعدات، مبنية على المعرفة والمهارة المتخصصة في العلوم الرياضية والفيزيائية والاجتماعية المتكاملة، مع التركيز على الأسس الهندسية وطرق التحليل والتصميم الهندسي، وذلك بهدف توقع وتقييم النتائج التي يمكن الحصول عليها من هذه الأنظمة".

ويتضح من هذا التعريف العام والشامل قدرة المتخصص في هذه المهنة، ومهارته في القيام بالعمل في المجالات الصناعية والخدمات الفنية المختلفة، حيث يستطيع القيام بتصميم الإنتاج واختبار وسائله، وكذلك تخطيط العمليات المناسبة لتصميم طرق التشغيل والقياس والرقابة بواسطة ربط العلوم الهندسية والتقنيات الصناعية مع علوم التخطيط والعلوم الاجتماعية الحديثة المرتبطة بالصناعة. ونتيجة لذلك فقد استفادت كثيراً من الدول الصناعية مثل اليابان والولايات المتحدة الأمريكية من هذه المهنة في جميع المجالات والتطبيقات الإنتاجية والاقتصادية وتطوير أنظمتها الصناعية، بل أصبح نادراً ما تخلو مؤسسة تعليمية أو صناعية من برامج الهندسة الصناعية.

ومع بداية النهضة الصناعية الحديثة، استُخدمت كثير من وظائف الهندسة الصناعية كتحديد مواقع المصانع، والتنظيم الداخلي للمصانع، وتخطيط الإنتاج والجدولة، تلي ذلك ميلاد جمعية المهندسين الصناعيين في الولايات المتحدة بعد الحرب العالمية الثانية مباشرة.

الرؤية:

الريادة في الهندسة الصناعية في العملية التعليمية التعلمية والبحث العلمي، والتعاون مع القطاعات الصناعية والخدمية السعودية.

الرسالة:

المساهمة الفاعلة في تقدم وتطور المجتمع السعودي، وتلبية احتياجاته التقنية والإدارية من خلال تعزيز قدرة الطلاب العلمية والعملية، وتأهيلهم لمسارات وظيفية ناجحة في مجال الهندسة الصناعية.

الأهداف:

- تزويد الطالب بمستوى عال من المعرفة في مجال الهندسة الصناعية، والقدرة على استخدام التقنيات الحديثة المناسبة والأدوات الهندسية بمهارة.
- إنتاج قادة الهندسة الصناعية الذين يصممون ويحسنون العمليات المحلية في قطاعات الصناعة والأعمال والحكومة.
- تشجيع الأنشطة البحثية وإعداد مرافق البحوث للبحث الموضوعي في المجالات الرئيسية للبرنامج، والتي هي مناسبة للاحتياجات المؤسسية والمجتمعية.
- تعزيز التعاون مع المجتمع بهدف تعزيز المصالح المشتركة.
- تزويد أصحاب العمل بخريجين مؤهلين تقنيا يتمتعون بالمهارات الإدارية والشخصية الأساسية، والقدرة على النمو مهنيا وتطوير حياتهم المهنية.

نبذة عن رئيس القسم:

رئيس القسم أستاذ الهندسة الصناعية المساعد صالح ال دكام، حصل سعادته على شهادة الدكتوراه والماجستير من جامعة كارولينا الشمالية في الولايات المتحدة الامريكية ومعهد فلوريدا التقني، التخصص العام الهندسة الصناعية وهندسة النظم والتخصص الدقيق هندسة نظم واساليب. كما حصل سعادته على شهادة البكالوريوس من جامعة الملك فهد للبترول والمعادن بتخصص الهندسة الصناعية والنظم.

المناصب الحالية:

- رئيس قسم الهندسة الصناعية.

الخطة الدراسية المقترحة:

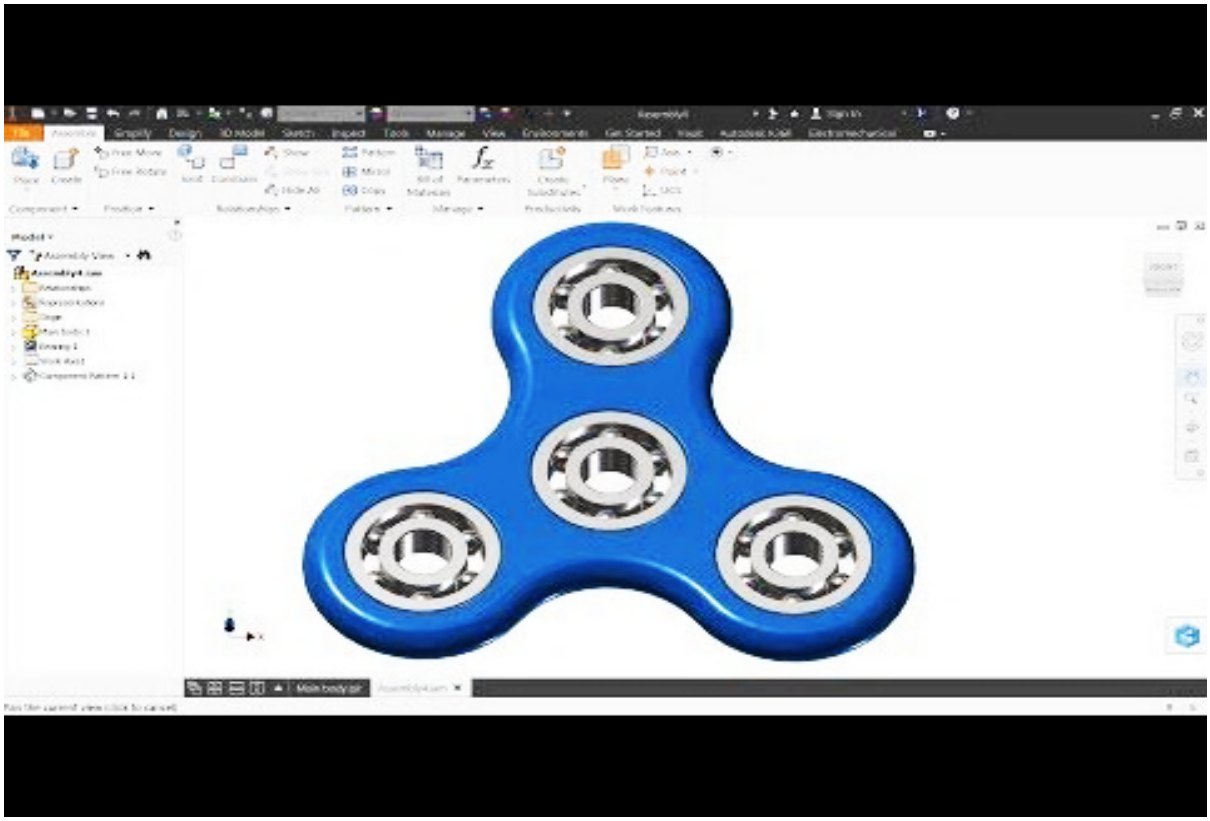
بعد دراسة تفصيلية لبعض الخطط الدراسية في جامعات بعض البلدان العربية والعالمية، أمكن وضع خطة دراسية للتخصص بأجمالي عدد ساعات 165 ساعة دراسية معتمدة، بحيث تتوافق الخطة الدراسية مع:

- **التطورات التكنولوجية العالمية الحديثة واحتياجات سوق العمل**
- **معايير هيئة اإلعتماد االكاديمي االمريكية للتخصصات الهندسية و التقنية (ABET)**
- **معايير الهيئة الوطنية للتقويم واالعتماد االكاديمي السعودية (NCAAA)**

معامل قسم الهندسة الصناعية:

معمل الرسم بمساعدة الحاسب الآلي CAD-CAM

يهتم هذا المعمل بالتعليم العملي لتطبيقات تصميم وتصنيع المنتجات، ويحتوي على تجهيزات حاسبات وبرامج لإعداد برامج تصاميم المنتجات. ويستخدم معمل الحاسب الآلي لتدعيم وصقل مهارات الطلاب في العمل على الحاسب في مجالات الهندسة الصناعية المختلفة. والمعمل مجهز بكافة الاحتياجات من الحواسب الآلية الحديثة والمتصلة بشبكة الإنترنت والطابعات اللازمة لمساعدة الطلاب على أداء مشروعاتهم والمهام المكلفين بها، والعروض التقديمية المطلوبة في مختلف المقررات باستخدام برنامج الرسم الصناعي Inventor.



شكل 1: معمل الرسم بمساعدة الحاسب الالي (CAD/CAM)

معمل الأتمتة وآلات التحكم الرقمي (CNC)

يهتم هذا المعمل بالتعليم العملي على أنظمة التحكم بآلات الإنتاج وبرمجتها المنطقية والحاسوبية لتعمل بصورة آلية، ويحتوي على أنظمة تحكم بواسطة الحاسوب ومحركات ومجسات للتحكم الصناعي وأتمتت آلات ومعدات وأنظمة الإنتاج. يهتم هذا المعمل بالتدريب على برمجة وتشغيل آلات الإنتاج التي تعمل بالتحكم الرقمي.

شكل 2: معمل الائتمتة وآلات التحكم الرقمي (CNC)

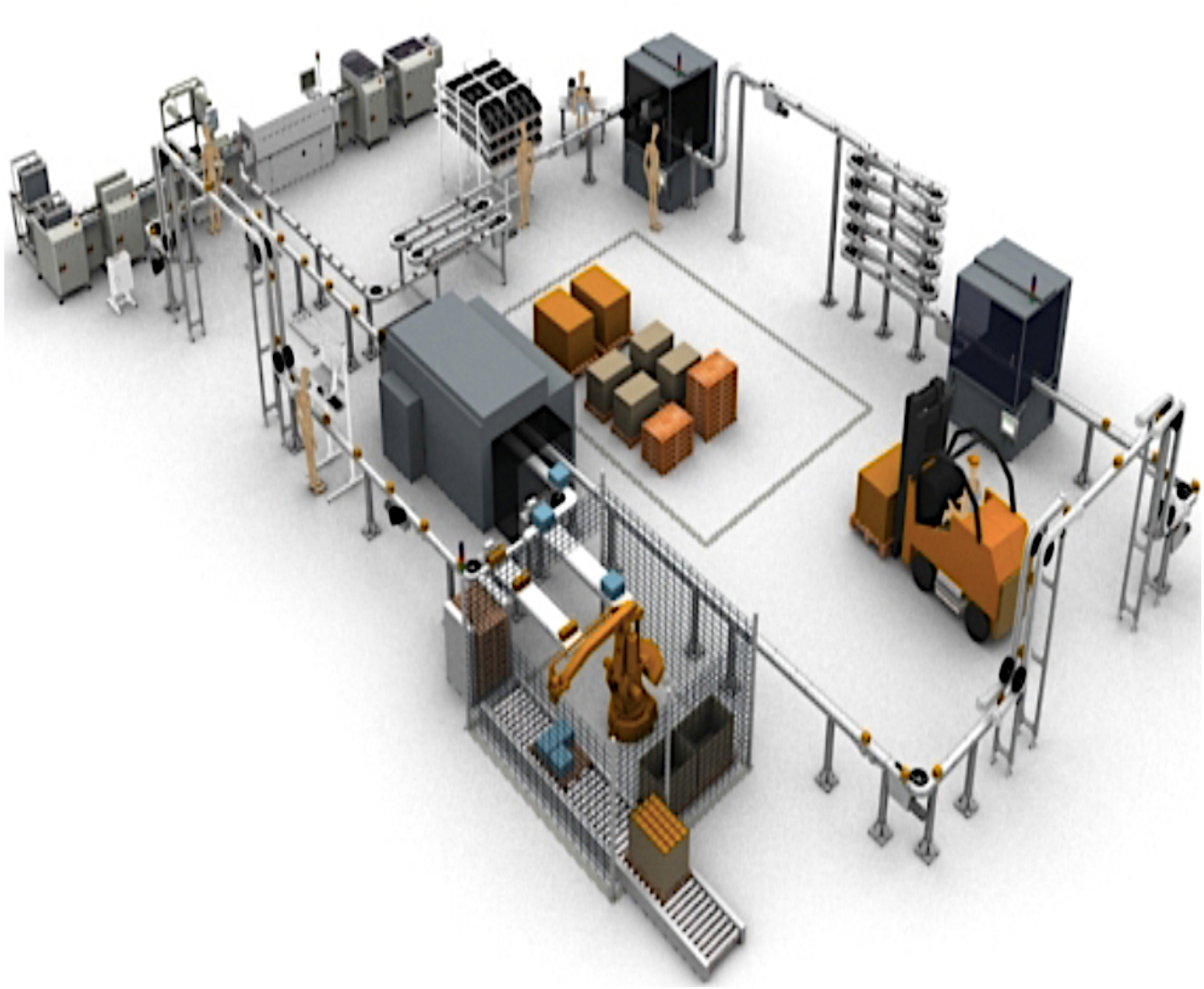
معمل القياسات الهندسية

يستخدم هذا المعمل في إجراء التجارب العملية المتعلقة بمقرر علم القياس؛ والتي تُعنى بالقياسات الدقيقة للأبعاد والزوايا، وتحديد أخطاء الشكل ومواصفات أسطح المشغولات الهندسية. ويحتوي المعمل على أدوات القياسات الدقيقة سواءً منها اليدوية المتنقلة أو الأجهزة الثابتة. ويتوفر بالمعمل عدد من الأجهزة الدقيقة الكهربية والرقمية، وبعضها متصل بأجهزة الحاسب الآلي، مما يوفر إمكانية إجراء قياسات الأبعاد بدقة تصل إلى 0.1 ميكرون، وللزوايا بدقة دقيقة واحدة، وكذلك إجراء الاختبارات المعقدة المختلفة مثل اختبار استواء الأسطح، وكذلك إجراء قياسات التروس وقياس خشونة الأسطح واستدارة الأعمدة.

شكل 3: معمل القياسات الهندسية

معمل محاكاة وتحليل الأنظمة الصناعية

يهتم هذا المعمل بالتعليم العملي لتطبيقات التصميم والتصنيع والتشغيل والصيانة لأنظمة الإنتاج بمحاكاة الواقع بصورة افتراضية، ويحتوي على الحاسبات وبرمجيات وأجهزة العمل الافتراضي. كما يهتم هذا المعمل بالتعليم العملي لتطبيقات المحاكاة للأنظمة الصناعية، وتصميم وتحليل عواملها المؤثرة على أدائها، ويحوي على أجهزة تحليل بيانات، وبرامج لتحليل، ومحاكاة الأنظمة وعملياتها.



شكل 4: معمل محاكاة وتحليل الأنظمة الصناعية

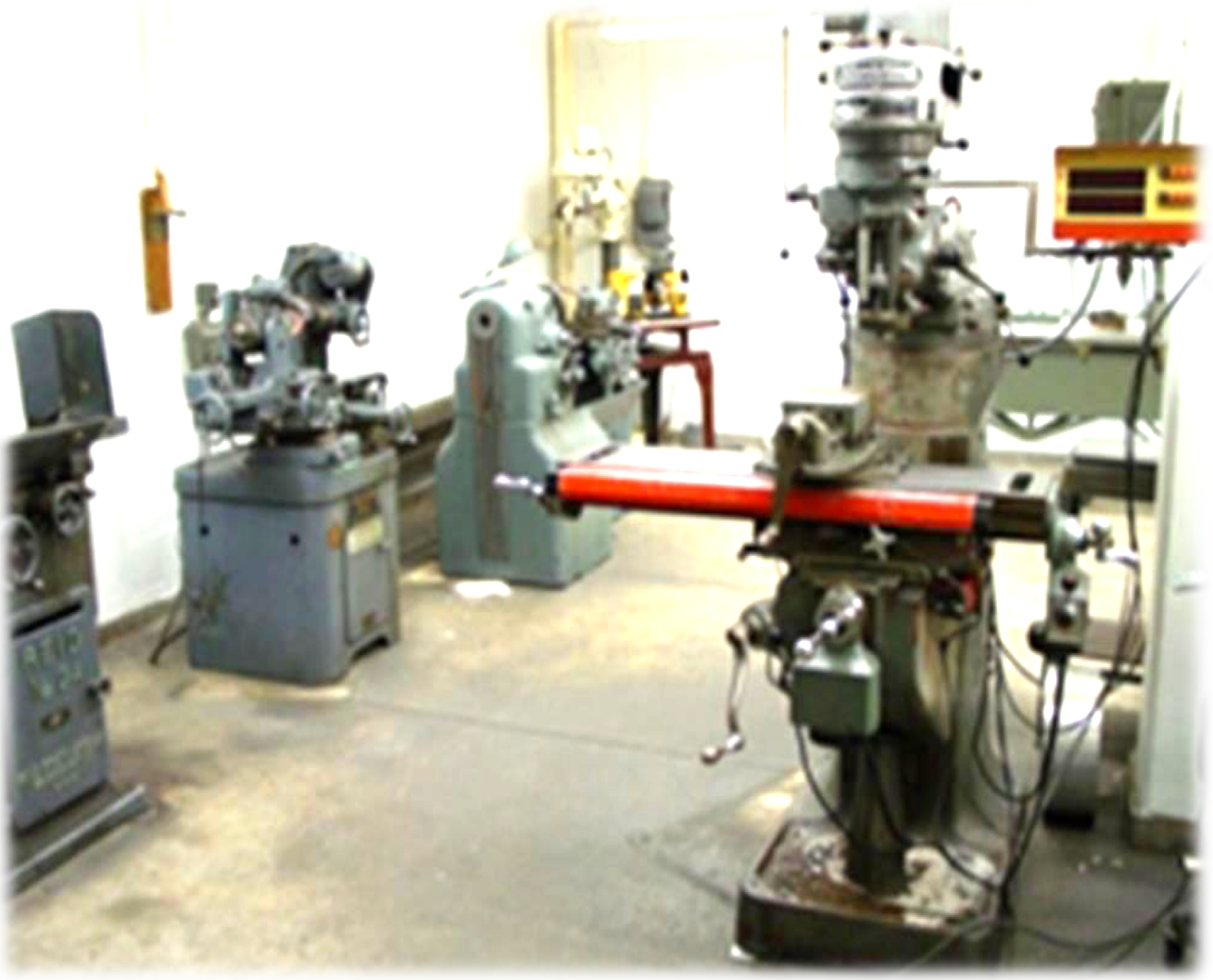
معمل التصنيع المتكامل بالحاسب وجهاز النماذج الأولية السريع

إجراء التجارب المتعلقة بمقرر التصنيع بمساعدة الحاسب الآلي، وعمل الأبحاث العلمية ذات العلاقة بالروبوت، وكذلك الاستفادة منه في مشاريع التخرج لطلبة القسم، وفي إجراء الاختبارات اللازمة للتأكد من صلاحية استخدام الأجهزة، والتجارِب المتعلقة بالتحكم الآلي للتحكم في العمليات الصناعية عن طريق الإنسان الآلي، وربط الأجهزة الصناعية والتحكم فيها عن طريق الحاسب الآلي باستخدام برنامج خاص للعمليات المطلوبة، وكذلك عمليات المراقبة المستمرة لعمل الأجهزة. جهاز النماذج الأولية السريع يتيح للطلاب بناء نماذج أولية من البلاستيك لتصاميمهم. والطلاب قادرون على إنتاج مخططاتهم، حتى لو كان التصميم معقداً للغاية.

شكل 5: معمل التصنيع المتكامل بالحاسب

معمل الورش الهندسية

يقدم هذا المعمل التدريب العملي لاستخدام آلات الإنتاج، ودراسة العوامل المؤثرة على تصنيع المواد، والقيام بتصميم واختيار أساليب التصنيع المناسبة وتسلسلها لتصنيع منتج معين، ويحوي على آلات الإنتاج التقليدية من آلات تشغيل المعادن (مخارط – فرايز – تجليخ – نشر – وغيرها)، وآلات تشكيل المعادن (مكابس) وآلات تصنيع غير تقليدية (إليكترو كيمائي – الليزر – وغيرها) وآلات تصنيع البلاستيك. وتتوفر مجموعة من المعدات والماكينات التي تستخدم في تدريب الطلاب في مجالات سباكة المعادن، وعمليات تشغيل وتشكيل المعادن.



شكل 6: معمل الورش الهندسية

جامعة ام القرى
كلية الهندسة بالقنفدة

برنامج دراسة البكالوريس
لقسم الهندسة الصناعية

"الترقيم ووصف المقررات بالعربي"

2021 م

1442 هـ

برنامج الدراسة لقسم الهندسة الصناعية
الترقيم والترميز

توصيف المقررات الدراسية

مقررات السنة الثانية

رقم المقرر	اسم المقرر	الساعات			الساعات المعتمدة
		نظري	عملي	الإجمالي	
الفصل الثالث					
57011105-3	استاتيكا	3	0	3	3
57001005-4	فيزياء عامة (2)	3	3	6	4
57021100-2	الرسم الهندسي	1	5	6	2
57001001-3	المعادلات التفاضلية للمهندسين	3	0	3	3
57002003-3	الإحصاء الهندسي والاحتمالات	3	0	3	3
28071001-2	الثقافة الاسلاميه (1)	2	0	2	2
الإجمالي					**17**
الفصل الرابع					
57001002-3	الجبر الخطي للمهندسين	3	0	3	3
57021500-2	مقدمة في الهندسة الصناعية	2	0	2	2
57021501-3	قياس وتحليل انظمة العمل	3	0	3	3
57021400-3	ادارة الافراد والمؤسسات	3	0	3	3
57031401-3	تحليل الدوائر (1)	2	3	5	3
28011001-2	القران الكريم (1)	2	2	0	2
الإجمالي					**16**

العدد الإجمالي للساعات المعتمدة للسنة الثانية **33**

57011105- استاتيكا **الساعات المعتمدة : 3** **نظري:3** **عملي:0**

المتطلب السابق: مقدمة في الرياضيات (2)

جبر المتجهات، تحليل و جمع القوى، تكافؤ القوى المزدوجة، أنظمة القوى في الإنشاءات الهندسية، انظمة الاجسام الصلبة، خصائص القوى والعزوم والمحصلات، شروط التوازن،قوة الاحتكاك، خواص المقاطع (المراكز و عزوم القصور الذاتي).

57001005-4	**فيزياء عامه (2)**	**الساعات المعتمدة:4**	**نظري:3**	**عملي:3**

المتطلب السابق: فيزياء (1)

القوانين و المفاهيم الأساسية للكهرباء (DC و AC)، الخصائص الكهربائية والضوئية والحرارية للمواد (بما في ذلك التركيب البلوري والترابط و نظرية الإلكترون الحر، ونظرية الحزمة للمواد الصلبة وأشباه الموصلات)، مقدمة في المغناطيسية والضوء، بما في ذلك مفاهيم ميكانيكيا الكم الفيزياءالذرية والنووية ، المبادئ الأساسية للحرارة، الميكانيكا والحركة الموجية.

57021100-	الرسم الهندسي	**الساعات المعتمدة:2**	**نظري:1**	**عملي:5**

المتطلب السابق: ------

مقدمة في أساسيات الرسم، انواع الخطوط، الرسومات ثنائية وثلاثية الأبعاد، المنظور الهندسي، رسم المساقط والمقاطع، الرسم الحر. استخدام الأوتوكاد في الرسم الهندسي ثنائي وثلاثي الأبعاد.

57001001-	المعادلات التفاضلية للمهندسين	**الساعات المعتمدة:3**	**نظري:3**	**عملي:0**

المتطلب السابق: مقدمة في الرياضيات (2)

المفاهيم الأساسية للمعادلة التفاضلية العادية، والحلول العامة والخاصة، الظروف الابتدائية والحدية، والمعادلات التفاضلية الخطية وغير الخطية، حل المعادلات التفاضلية من الدرجة الأولى والثانية وتطبيقاتها، المعادلات التفاضلية العليا ، نظريه العوامل و تطبيقاتها، ومقدمة في المعادلات التفاضلية الجزئية.

57002003-3	الإحصاء الهندسي والاحتمالات	**الساعات المعتمدة:3**	**نظري:3**	**عملي:0**

المتطلب السابق: مقدمة في الرياضيات (2)

الاحصاء الوصفي ، مفاهيم الاحتمالات، المتغيرات العشوائية المنفصلة والمتصلة والتوزيعات، التوزيعات الاحتمالية المشتركة، والتغاير والترابط بين المتغيرات العشوائية، التقدير ، توزيع العينات، اختبار الفرضيات، مقدمة الانحدار الخطي البسيط. تمارين عملية على تطبيق الأساليب الإحصائية في مجال الهندسة

57001002-3	**الجبر الخطي للمهندسين**	**الساعات المعتمدة:3**	**نظري:3**	**عملي:0**

المتطلب السابق: مقدمة في الرياضيات (1)

مصفوفة الجبر الأساسية بما في ذلك معكوس المصفوفة، المصفوفات، الأنظمة الخطية، المحددات، القيم المميزة، المتجهات المميزة، فضاء المتجهات، حل النظم الخطية وطريقة جاوس للحذف، التحولات الخطية، تطبيقات الحاسوب في الجبر الخطي.

57021500-	مقدمة في الهندسة الصناعية	**الساعات المعتمدة:2**	**نظري:2**	**عملي:0**

المتطلب السابق: ---

مقدمة في التصميم الهندسي، عملية التصميم، تحديد المشكلات ومتطلبات العميل، مهام ومتطلبات الهندسة الصناعية، تقييم واقتراح بدائل التصميم، مقدمة عامة عن المهنة، بما في ذلك التخطيط الوظيفي والكفاءة المهنية والاتصالات، والأخلاق، والعمل الجماعي. عملية التصميم الهندسي وأساليب حل المشاكل بالتنسيق والتخطيط.

57021501-3	قياس وتحليل انظمة العمل	**الساعات المعتمدة:3**	**نظري:3**	**عملي:0**

المتطلب السابق: الإحصاء الهندسي والاحتمالات

دراسة عمليات الإنتاج والتصنيع والخدمات وتحليلها باستخدام الجداول المختلفة، تحسين تصميم طرق العمل والعمليات باستخدام الوقت والحركة ووضع طرق عمل وعمليات قياسية ومعيارية، أدوات قياس الحركة والوقت وطرق تحويلها إلى قياسات معيارية، عمل مشروع لتطبيق المفاهيم السابقة في الميدان.

57021400-3	ادارة الافراد والمؤسسات	**الساعات المعتمدة:3**	**نظري:3**	**عملي:0**

المتطلب السابق: الإحصاء الهندسي والاحتمالات

يقدم هذا المقرر تحليل شامل للسلوك الفردي والجماعي في المؤسسات، والغرض منه هو تقديم فهم للكيفية التي يمكن أن تدار بها المؤسسات بفعالية أكثر، وفي الوقت نفسه تحسين حياة الموظفين النوعية. والمواضيع التي يشملها المساق: الحوافز، المكافآت، الإجهاد، السلوك الفردي والجماعي، السلطة والسياسات، القيادة، تصميم العمل، الهيكل التنظيمي، صنع القرار، التواصل والتغيير التنظيمي والتطوير، والتصميم والتحكم. ويتم تحليل الدور المتغير لمدراء الموارد البشرية في بيئة تنافسية. ويتم تعريف الطلاب بمجموعة متنوعة من المهارات العملية من خلال لعب الأدوار والمناقشات الصفية، والعمل الخاص

57031401-3	تحليل الدوائر (1)	**الساعات المعتمدة:3**	**نظري:2**	**عملي:3**

المتطلب السابق: مقدمة في الرياضيات(2)

قوانين اوم وكيرشوف، توصيل التوالي والتوازي، تجزئة التيار والفولطية، التحليل الشبكي والنقطي، نظرية التراكب، نظريات نورتون وثيفينن، المحاثة والمواسع، دارات (مقاومة- محاثة) و(مقاومة – مواسع) بدون مصدر، دارات (مقاومة و محاثة ومواسع) ، خصائص الاشارة الجيبية، مبدأ الطور، علاقات الطور لعناصر المقاومة والمحاثة والمواسع، الممانعة والمسامحة، القيم الفعالة للتيار والفولطية، القدرة اللحظية والمتوسطة والظاهرية ومعامل القدرة، توصيلات مثلث ونجمة ثلاثية الاطوار، مقدمة إلى أشباه الموصلات، الثنائي، دوائر التقويم البسيطة، الترانزستور، دوائر التضخيم البسيطة، المحولات الكهربائية، تصنيف الالات الكهربائية ومبدأ عملها، اعتبارات السلامة، تأريض التجهيزات الكهربائية.

مقررات السنة الثالثة

الفصل الخامس						
رقم المقرر	اسم المقرر	الساعات				العدد الإجمالي للساعات المعتمدة
		نظري	عملي	الإجمالي	الساعات المعتمدة	
57022101-3	الموائع والعلوم الحرارية	2	3	5	3	
57022102-3	الديناميكا والاهتزازات	3	0	3	3	

57022300-3	المواد الهندسية	2	3	5	3	
57022200-3	تطبيقات الحاسب في الهندسة الصناعية	2	3	5	3	
57022006-3	بحوث العمليات (1)	3	0	3	3	
57012106-1	التقارير الهندسية	1	0	1	1	
28012001-2	القران الكريم (2)	2	0	2	2	
الإجمالي					**18**	
الفصل السادس						
57003004-3	الطرق الحسابية الهندسية	2	3	5	3	
57022301-3	القياسات الهندسية	2	3	5	3	
57022502-3	هندسة العوامل البشرية	2	3	5	3	
57022302-3	عمليات التصنيع (1)	2	3	5	3	
57022504-3	تخطيط الانتاج وضبط المخزون	3	0	3	3	
28072001-2	الثقافة الاسلامية (2)	2	0	2	2	
5702391-1	التدريب الصيفي الاول	(اجتياز 80 ساعة معتمده)			1	
الإجمالي					**18**	

57022101-3 الموائع والعلوم الحرارية	**الساعات المعتمدة:3**	**نظري:2**	**عملي:3**

المتطلب السابق: استاتيكا

يغطي هذا المساق خصائص الموائع، تصنيف سريان الموائع، الموائع الغير متحركة، معادلات حفظ الكتلة، معادلات حفظ التسارع، حفظ الطاقة للموائع. ويتضمن ايضاً خصائص المواد النقية، منحنى الحرارة – الضغط – الحجم [P-V-T] ،جداول خواص المواد، القانون الأول والثاني للديناميكا الحرارية. التوصيل الحراري المستقر بمحور واحد، الحمل الحراري الحر، وإنتقال الحرارة بالإشعاع

مختبر الموائع والعلوم الحرارية

يتضمن المختبر تجارب تحليلية لتدفق السوائل، ونقل الحرارة، والانظمة الثيرموديناميكية

57022102-3	الديناميكا والاهتزازات	**الساعات المعتمدة:3**	**نظري:3**	**عملي:0**

المتطلب السابق: استاتيكا

يغطي هذا المقرر تحليل الحركة النسبية للسرعة والتسارع، الأجسام الثابتة تحت القوى والتسارع، تحليل الحركة بطريقة الشغل والطاقة، كما يتضمن المقرر الاهتزاز الحرّ للأجسام، الحركة المتناسقة والإخماد، المؤثرات المتناسقة للأنظمة المخمدة وغير المخمدة، ومقدمة في الاهتزازات الإجبارية.

57022300-3	المواد الهندسية	**الساعات المعتمدة:3**	**نظري:2**	**عملي:3**

المتطلب السابق: كيمياء عامة

تصنيف المواد، تركيب المواد، الخواص الميكانيكية، الشكل البياني الثنائي للأطوار، السبائك الحديدية وغير الحديدية، السيراميك والبوليمرات والسبائك المركبة. طاقة وقوى الربط، تصنيف المواد الهندسية، التركيب البلوري للمواد، تحييد الأشعة السينية، العيوب في تركيب المواد وأساليب التقوية، الانتشار، التصوير البلوري، الخواص الميكانيكية وغير الميكانيكية للمواد، طرق اختبار المواد، الشكل البياني للأطوار، تآكل المعادن وطرق الوقاية منه، مشاكل اختيار المواد، الكلفة النسبية للمواد.

57022200-3	**تطبيقات الحاسب في الهندسة الصناعية**	**الساعات المعتمدة:3**	**نظري:2**	**عملي:3**

المتطلب السابق : الجبر الخطي للمهندسين

هيكلة البرمجة باستخدام لغة C، أنواع البيانات المهيكلة والمعرفة من قبل المستخدم ، توضيح الهيكلة البسيطة والمعقدة، ظروف تكرار الهيكلة، المهام والإجراءات, المكتبات الأساسية، تخصيص الذاكرة الديناميكية، مقدمة لكائنية التوجه والبرمجة المرئية. تطبيقات ونماذج أساسية للهندسة الصناعية

57022006-3	بحوث العمليات (1)	**الساعات المعتمدة:3**	**نظري:3**	**عملي:0**

المتطلب السابق: الأحصاء الهندسي والاحتمالات

النمذجة الرياضية وبحوث العمليات، البرمجة الخطية، طريقة سمبلكس، الثنائية، وسائل النقل والتعيين، نماذج الشبكات.

57012106-1	**التقارير الهندسية**	**الساعات المعتمدة:1**	**نظري:1**	**عملي:0**

المتطلب السابق : اللغة الانجليزية التقنية

تعريف مفاهيم ومنهجية البحث، أخلاقيات البحث، تحديد المشكلة، إعداد خطة البحث، جمع البيانات وعرضها وتحليلها، تصميم تقرير البحث، مبادئ والإجراءات كتابة التقارير الهندسية، تنظيم المعلومات، وكتابة نماذج متخصصة مثل الملخصات والتعليمات والمقترحات، وكتابة البريد الإلكتروني الرسمي

57003004-3	الطرق الحسابيه الهندسية	**الساعات المعتمدة:3**	**نظري:2**	**عملي:3**

المتطلب السابق: المعادلات التفاضلية للمهندسين

جذور المعادلات غير الخطية، والنظم الخطية: طرق المصفوفه، طريقة جاوس للحذف، طريقة جاوس سيدل، ، الأخطاء المصادر، التقديرات، الانتشار ، حسابات النقطة العائمة و العمليات الحسابيه والمنحنى المناسب، والاستيفاء، والحل العددي للمعادلات التفاضلية، طريقة العنصر المحدد ، طرق لاغرانج، واويولر و رونج كوتا

57022301-3	القياسات الهندسية	**الساعات المعتمدة:3**	**نظري:2**	**عملي:3**

المتطلب السابق: تحليل الدوائر (1)

الأخطاء، القياسات الخطية وقياسات الزاوية، عمود الجيب والمنضدة الدوارة، التفاوت والتوافق، والتداخل، نظام آيزو، قياس المسننات والتروس، قياس استوائية وخشونة السطح والخروج عن الاستدارة، قياس التدفق ودرجة الحرارة، القياسات الكهربائية الأساسية والمجسات، قياس الانفعال والقوة والعزم وتصميم خلايا الحمل.

57022502-3	هندسة العوامل البشرية	**الساعات المعتمدة:3**	**نظري:2**	**عملي:3**

المتطلب السابق: قياس وتحليل انظمة العمل

العمل العضلي وتحديد الإمكانيات والقدرات الفيزيائية والفسيولوجية، رفع كفاءة العمل العضلي، قياسات جسم الإنسان، العمل العقلي وتحديد الإمكانيات والقدرات العقلية، وسائل استقبال المعلومات وطرق معالجتها واتخاذ القرار عند الإنسان، تصميم أجهزة ووسائل عرض المعلومات وأدوات التحكم بالآلة، دراسة المؤثرات البيئية الاجتماعية والفيزيائية على أداء العامل.

57022302-3	عمليات التصنيع (1)	**الساعات المعتمدة:3**	**نظري:2**	**عملي:3**

المتطلب السابق: المواد الهندسية

عمليات السباكة (التجمد والصهر، الأفران، السباكة في القوالب الدائمة والمستهلكة)، عمليات التشكيل اللدن الحجمي (التشكيل على البارد والساخن، قابلية التشكيل وحدوده)، قابلية تشكيل الرقائق، عمليات تصنيع اللدائن، عمليات التصنيع من بودرة المعادن والخزفيات، عمليات اللحام. المعالجة الحرارية للمعادن

معمل عمليات التصنيع (1)

يتضمن المعمل طرق تشكيل المعادن والاختبارات الميكانيكية

57022504-3	تخطيط الانتاج وضبط المخزون	**الساعات المعتمدة:3**	**نظري:3**	**عملي:0**

المتطلب السابق : ادارة الافراد والمؤسسات

المفاهيم الأساسية لإدارة الإنتاج والعمليات (POM) ، تصميم المنتجات والخدمات، العمليات والتقنيات ، التجارة الإلكترونية وإدارة العمليات، ادارة المخزون، إدارة الإمدادات، فقط في الوقت المناسب والإنتاج الهزيل، التنبؤ، متطلبات تخطيط المواد (MRP)، مقدمة إلى متطلبات تخطيط المؤسسات (ERP) القدرة والتخطيط الكلي، الجدولة

57023901-1	التدريب الصيفي الاول	الساعات المعتمدة:1	نظري:	عملي:

المتطلب السابق: اجتياز 80 ساعة معتمدة

علي الطلاب القيام بالتدريب في احدي المؤسسات الحكومية أو الشركات تحت إشراف أحد أعضاء هيئة التدريس بالكلية. ويجب على كل طالب تقديم تقرير تقني مفصل في نهاية فترة التدريب موضحا ما تعلمه خلال فترة التدريب

مقررات السنة الرابعة

رقم المقرر	اسم المقرر	الساعات			الساعات المعتمدة	العدد الإجمالي للساعات المعتمدة للسنة الثانية
		نظري	عملي	الإجمالي		
الفصل السابع						
57023303-3	عمليات التصنيع(2)	2	3	5	3	33
57023007-3	بحوث العمليات(2)	3	0	3	3	
57023503-3	نظم المعلومات الصناعية	2	3	5	3	
57011104-2	الإقتصاد الهندسي	2	0	2	2	
57014101-2	أخلاقيات هندسية	2	0	2	2	
28073001-3	الثقافة الاسلامية (3)	3	0	3	3	
الإجمالي					**16**	
الفصل الثامن						
57023201-3	التصميم والتصنيع باستخدام الحاسب	2	3	5	3	
57023304-3	الأتمتة والتحكم الآلي	2	3	5	3	
57023305-3	محاكاة النظم الصناعية	2	3	5	3	
57023401-3	هندسة الأمن الصناعي	3	0	3	3	
28021001-2	اللغة العربية	2	0	2	2	
28071002-2	السيرة النبوية	2	0	2	2	
5702492-1	التدريب الصيفي الثاني	اجتياز 120 ساعة معتمده			1	
الإجمالي					**17**	

57023303-3	عمليات التصنيع (2)	الساعات العتمدة:3	نظري:2	عملي:3

المتطلب السابق: عمليات التصنيع (1)

عمليات التشغيل: عميات التشغيل التقليدية، العمليات ذات الحد القاطع الواحد، العمليات متعددة الحدود القاطعة. معدل إزالة الرايش وانواعه، قوى القطع، زاوية القص مقابل اجهاد القص، مواد أدوات القطع، عمر أداة القطع. عمليات التشغيل الغير تقليدية: استخدام الطاقة الميكانيكية، عمليات التشغيل الكهروكيميائية، استخدام الطاقة الحرارية، القطع الكيميائي، القطع بالليزر، استخدام الموائع المضغوطة والهواء مع المواد الحاكة. التحكم الرقمي في ماكينات القطع

معمل عمليات تصنيع (2)

التجارب المعملية: التعامل مع عمليات تشغيل المواد الأساسية، التداخلات والسماحيات

بحوث العمليات (2)	**الساعات المعتمدة:3**	**نظري:3**	**عملي:0**

المتطلب السابق : بحوث العمليات(1)

النماذج الاحتمالية والإحصائية المستعملة في نظم الهندسة الصناعية مثل :ماركوف، العمليات الإحصائية، نماذج الانتظار وتطبيقاتها، النماذج الاحتمالية المنفصلة والمتصلة.

57023503-3 **نظم المعلومات الصناعية**	**الساعات المعتمدة:3**	**نظري:2**	**عملي:3**

المتطلب السابق : الجبر الخطي للمهندسين

المفاهيم العامة، قيمة المعلومات وخصائصها، الأنواع المختلفة من نظم المعلومات، مفاهيم نظم المعلومات الإدارية، تحليل وتصميم وتطوير نظم المعلومات الصناعية، تطوير نظم المعلومات باستخدام الحواسيب الصغيرة

57011104-2 الاقتصاد الهندسي	**الساعات المعتمدة:2**	**نظري:2**	**عملي:0**

المتطلب السابق: ---

يغطي المساق مفاهيم التكلفة،القيمة الزمنية للنقود، صيغ الفائدة، التدفق النقدي والحسابات المكافئة، التضخم والضرائب، قياس استحقاقات الاستثمار، تقييم المشروعات، الاستهلاك، وتحليل نقطة التعادل والحلول البديلة.

5701 4101-2 اخلاقيات هندسية	**الساعات المعتمدة:2**	**نظري:2**	**عملي:0**

المتطلب السابق : ---

القوانين واللوائح والقوانين التي تنظم الممارسة المهنية والمسؤوليات والالتزامات، والتشريعات البيئية، والآثار الاجتماعية للخدمات الهندسية والعلاقات بين المهندس والعميل والجمهور فيما يتعلق بالقضايا الأخلاقية والأخلاق في الإسلام، والتطبيقات المعاصرة

57023201-3 التصميم والتصنيع باستخدام الحاسب	**الساعات المعتمدة:3**	**نظري:2**	**عملي:3**

المتطلب السابق : عمليات التصنيع (2)

أساسيات استخدام الحاسوب في الهندسة والتصميم، تطبيقات التصميم باستخدام الحاسوب، النمذجة الهندسية، التحليلات الهندسية، أسلوب نهايات الأجزاء، التحليلات ذات البعد الواحد والبعدين والأبعاد الثلاث، تحليل التصميم، الرسم بالحاسوب، التكامل بين التصميم والتصنيع باستخدام الحاسوب، وأمثلة التصميم باستخدام الحاسوب.

57023304-	الاتمتة والتحكم الآلي	**الساعات المعتمدة:3**	**نظري:2**	**عملي:3**

المتطلب السابق : الديناميكا والاهتزازات

يغطى هذا المساق مقدمة في نظرية التحكم الخطي باستخدام التغذية الراجعة، التمثيل الرياضي للأنظمة الفيزيائية، الدالات الانتقالية، الرسومات التمثيلية والرسم باستخدام مسار الإشارات، البعد الزمني التحليلي لأنظمة التحكم، الإشارات الاختبارية، الاستجابة العابرة، مواصفات البعد الزمني، ثبات وخطأ حالة الاستقرار. يغطي هذا المساق كذلك المجسات، المحركات، التحويل من إشارة رقميه إلى متصلة وبالعكس، والأنظمة الهيدروليكية والنيوماتيكية، والمتحكمات المنطقية المبرمجة والتصنيع باستخدام الحاسوب..

مختبر الأتمتة والتحكم

يغطي هذا المختبر عدد من التجارب والتدريب العملي حول التحكم بأنظمة ميكانيكية بإستخدام معاملات طردية/ طردية واشتقاقية/ طردية – اشتقاقية – تكاملية/ التحكم بطاوله الأتجاهين X,Y بإستخدام موتورات متدرجة ، تطوير برنامج سُلمي منطقي للتحكم بـأجهزة البرمجة المنطقية، أنظمة التحكم النيوماتيك والسيرفو، تطبيق أنظمة تحكم بإستخدام برمجيات متخصصة، التعريف بإستخدامات مختلف أنواع المجسات والتصنيع بإستخدام الحاسوب (الروبوت، السيور، وألآت التشغيل).

57023305-3	محاكاة النظم الصناعية	**الساعات المعتمدة:3**	**نظري:2**	**عملي:3**

المتطلب السابق : الطرق الحسابية الهندسية

النماذج الاحتمالية، المحاكاة اليدوية، نماذج المدخلات، نماذج المحاكاة للأنظمة المختلفة باستخدام أحد البرمجيات الجاهزة، دقة وصحة نماذج المحاكاة، تحليل المخرجات، أدوات تقليل التباين في المخرجات، حالات دراسة.

مختبر محاكاة النظم الصناعية

يتضمن المختبر مشروع محاكاة جماعي ومختبر تدريس لغة ذات مستوى متقدم وإستضافة محاضرين من الصناعة لتقديم آرائهم حول عملية إدارة المشروع

57023401-3	**هندسة الأمن الصناعي**	**الساعات المعتمدة: 3**	**نظري:3**	**عملي:0**

المتطلب السابق : هندسة العوامل البشرية

دراسة مكان العمل والمخاطر المتعلقة به، تحليل المخاطر ودراسة مفاهيم الحوادث واحتمالية الخطر، دراسة أنظمة السلامة والصحة المهنية، وربطها مع القوانين والمتطلبات الحكومية والعالمية، طرق التحكم بالمخاطر المختلفة في الصناعة، تصميم الأنظمة الإدارية لإدارة أنظمة السلامة والصحة المهنية

57024902-1	التدريب الصيفي (2)	**الساعات المعتمدة:1**	**نظري:**	**عملي:**

المتطلب السابق : : اجتياز 120 ساعة معتمدة

علي الطلاب القيام بالتدريب في احدي المؤسسات الحكومية أو الشركات تحت إشراف أحد أعضاء هيئة التدريس بالكلية. ويجب على كل طالب تقديم تقرير تقني مفصل في نهاية فترة التدريب موضحا ما تعلمه خلال فترة التدريب

مقررات السنة الخامسة

رقم المقرر	اسم المقرر	الساعات			الساعات المعتمدة	العدد الإجمالي للساعات المعتمدة للسنة الثانية 31
		نظري	عملي	الإجمالي		
الفصل التاسع						
57024908-1	مشروع التخرج (تصميم) (1)	1	0	1	1	
57024402-3	اللوجستية وادارة سلسلة التوريد	3	0	3	3	
57024404-3	ادارة المشاريع الصناعية	3	0	3	3	
57024xxx-3	مقرر اختياري (1)	3	0	3	3	
57024xxx-3	مقرر اختياري (2)	3	0	3	3	
28013001-2	القران الكريم (3)	2	0	2	2	
الإجمالي					15	
الفصل العاشر						
57024909-3	مشروع التخرج (تصميم) (2)	3	0	3	3	
57024403-3	الموثوقية وإدارة الصيانة	3	0	3	3	
57024405-3	ضبط الجودة الصناعية	3	0	3	3	
57024505-3	تصميم وتخطيط المرافق	3	0	3	3	
28074001-2	الثقافة الاسلامية (4)	2	0	2	2	
28014001-2	القران الكريم (4)	2	0	2	2	
الإجمالي					16	

57024908-1	مشروع التخرج (تصميم) (1)	الساعات المعتمدة:1	نظري:1	عملي:0

المتطلب السابق: التقارير الهندسية

يقوم مجموعة من الطلاب باعداد مقترح مشروع ومراجعة الأدبيات ذات الصلة، ووضع خطة العمل، والحصول على البيانات، وإجراء التصاميم الأولية ودراسات الجدوى، وتقييم البدائل للتحضير لمشروع التخرج الثاني.ويلزم أيضا تقديم عرض تقني للتقرير الفني المرحلي

57024402-3	اللوجستية وادارة سلسلة التوريد	الساعات المعتمدة:3	نظري:3	عملي:0

المتطلب السابق : تخطيط الانتاج وضبط المخزون

سيكون التركيز على التصميم والتخطيط والتنظيم والسيطرة على الأنشطة المرتبطة بها، وسيتم تناول المواضيع التالية: هيكل سلسلة التوريد، والأهداف وتقييم برامج التشغيل والمقاييس، تصميم الشبكات ومكان المنشأة في سلسلة التوريد، العرض والطلب والتنبوء بالمبيعات والركام والتخطيط، التخطيط وإدارة المخزون في سلسلة التوريد وعمليات النقل وتوفير المصادر والمشتريات والتسعير، تكنولوجيا المعلومات في إدارة سلسلة التوريد،

57024404-3	ادارة المشاريع الصناعية	الساعات المعتمدة:3	نظري:3	عملي:0

المتطلب السابق: إدارة الافراد والمؤسسات

سيكون التركيز على أنشطة التخطيط والتحكم في المشاريع القائمة بعقود وتغير المشاريع في العديد من المناطق الصناعية، تتم مقارنة نظرية إدارة المشاريع التي أنشئت لعدد من الحالات، ابتداء من توفير فهم أساسي من الانضباط والإدارة للمشاريع ، ويغطي المقرر موضوعات مثل تخطيط المشاريع، وتنظيم المشاريع، والرقابة الإدارية والقيادية للمشروع، التخطيط الشامل المتكامل لجميع الأنشطة المطلوبة من خلال استخدام مخطط جانت، طريقة المخطط السهمي، طريقة المخطط التصدري لجدولة الوقت والنفقات والموارد لإنجاز المشروع بنجاح، تحليل الوقت والكلفة وتوزيع الموارد

57024909-3	مشروع التخرج (تصميم) (2)	الساعات المعتمدة:3	نظري:3	عملي:0

المتطلب السابق: مشروع التخرج (تصميم) (1)

لتكملة تصميم مشروع التخرج الأول تعمل فرق العمل على تحليل كامل وتصميم مشروعها، يتوقع من كل طالب في الفريق التعامل مع مهمة محددة للمشروع وتنسيق العمل مع بقية المجموعة، يطلب من كل فريق أن يقدم التصميم الأولي مع جميع الوثائق اللازمة والرسوم، وعلي الفريق أيضا تقديم عرض نهائي للمشروع في نهاية الفصل

57024403-3	الموثوقية وادارة الصيانة	الساعات المعتمدة:3	نظري:3	عملي:0

المتطلب السابق : تخطيط الانتاج وضبط المخزون

الموثوقية في التصميم، نماذج الموثوقية، تقييم الموثوقية خلال مرحلة تطوير ما قبل الإنتاج والاختبار، والمشاكل الخاصة في مجال الصيانة وقطع الغيار عمليات ماركوف، مرافق التشغيل والصيانة، استراتيجية التشغيل والصيانة، التنبؤ بالعمل والاعطال، القدرة على التخطيط والصيانة، نماذج قرار استبدال عنصر والقياس ومعايير الصيانة وجدولة الصيانة ومراقبة المواد، نوعية الوظائف، نظم المعلومات الإدارية والإنتاجية وتدقيق الصيانة ودراسات الحالة

57024405-3	ضبط الجودة الصناعية	الساعات المعتمدة:3	نظري:3	عملي:0

المتطلب السابق : ادارة المشاريع الصناعية

مقدمة لأنظمة الجودة، تكلفة الجودة. إدارة الجودة الشاملة: نظم الجودة والمعايير: ستة سيغما وISO، إعادة الهيكلة. مراقبة الجودة الإحصائية: الرسوم البيانية لمراقبة المتغيرات والصفات، تحليل قدرة العملية، خطط قبول العينات، تطوير مهام الجودة، دوائر الجودة، مهام فقدان الجودة

57024505-3	تصميم وتخطيط المرافق	**الساعات المعتمدة:3**	**نظري:3**	**عملي:0**

المتطلب السابق: اللوجستية وادارة سلسلة التوريد

التخطيط الاستراتيجي للمنشآت، اختيار الموقع والمنتج، تصميم العملية والبرنامج الزمني، العلاقة بين نوع النشاط والمساحة والتدفق، تحديد العمالة، أنظمة مناولة المواد، توزيع الآلات عن طريق الكمبيوتر وتصميم المخازن

المقررات الاختيارية

مجموعة النظم والإدارة الهندسية

57024903-3	موضوعات مختارة في الإدارة الهندسية	**الساعات العتمدة:3**	**نظري:3**	**عملي:0**

المتطلب السابق: إدارة المشاريع الصناعية

تطرح المادة بمواضيع خاصة لها أهمية بنواحي مختلفة في الإدارة الهندسية

57024506-3	نمذجة وتصميم أنظمة الاعمال	**الساعات العتمدة:3**	**نظري:3**	**عملي:0**

المتطلب السابق: محاكاة النظم الصناعية

يتناول هذا المقرر: تطوير وتنفيذ والاستفادة من نماذج الأعمال لاتخاذ القرارات الإدارية، وتقنيات مختلفة لوضع النماذج التحليلية مثل التنبؤ، والتحسين، والمحاكاة، تحليل القرار، والتصنيف ، المفاهيم والأدوات التي تدعم و تحدد نظم المعلومات والتصميم وعملية التطوير

57024404-3	التخطيط الاستراتيجي	**الساعات العتمدة:3**	**نظري:3**	**عملي:0**

المتطلب السابق: إدارة الأفراد والمؤسسات

طبيعة التخطيط الاستراتيجي، بناء الاستراتيجية: تحديد المهمة والرؤية والقيم والاهداف، التقييم الخارجي، التقييم الداخلي، التحليل والاختيار. تنفيذ الاستراتيجية: الادارة، التسويق، المالية والمحاسبة، البحث والتطوير. مراجعة الاستراتيجية وتقييمها

57024403-3	6 سيقما	الساعات العتمدة:3	نظري:3	عملي:0

المتطلب السابق: الطرق الحسابية الهندسية

تضم ستة سيجما إطارين - DMAIC (تعريف، قياس، تحليل، تحسين، مراقبة) و DMADV (تعريف ، قياس، تحليل، تصميم، تحقق) ويغطي هذا المقرر كلا من : الإنتاج الضعيف ، التنبؤ ، متطلبات التخطيط للمواد (MRP) ، مقدمة في متطلبات تخطيط المشاريع، (ERP) ، القدرة والتخطيط الكلي والجدولة

57024404-3	الذكاء الاصطناعي	الساعات العتمدة:3	نظري:3	عملي:0

المتطلب السابق: بحوث العمليات (1)

الذكاء الاصطناعي (AI) يدرس كيفية تحقيق سلوكيات الإنسان الذكي على جهاز الكمبيوتر ويجعل جهاز الكمبيوتر/آلة قادرة على التعلم، والتخطيط، وحل المشاكل بشكل مستقل، ويشمل :حل المشاكل ، المنطق المبني على أساس الحالات والخبرات والتخطيط والبرمجة التلقائية، والتعلم الآلي، وإدارة أساس المعرفة، نظم الخبرة، والتعرف على الأنماط، المنطق الضبابي، شبكات النظرية الافتراضية والعصبية، الخوارزميات الجينية والتطورية لقرار حل أمثل .وعلاوة على ذلك، على حد سواء فهم اللغة الطبيعية ورؤية الكمبيوتر يمكن حلها باستخدام الأساليب المتقدمة في مجال التعرف على الأنماط

57024008-3	الإحصاء الهندسي المتقدم	الساعات العتمدة:3	نظري:3	عملي:0

المتطلب السابق: الإحصاء الهندسي والاحتمالات

تركز هذا المقرر على طرق الإحصاءات المتقدمة بما في ذلك خواص وتقدير نموذج الانحدار الخطي، افتراضات غاوس- ماركوف، الارتباطات المتسلسلة، الأخطاء في المتغيرات، الاختبارات الفرضية واختبارات الكمية المحددة، الاقتصاد القياسي للبيانات، تحليل السلاسل الزمنية. ويشمل كذلك: تقنيات متعددة المتغيرات في الإدارة الهندسية، جوانب تحليل البيانات الكمية، بما في ذلك اختبار النموذج، نظرية القرار

مجموعة التصميم والتصنيع الهندسي

57024904-3	موضوعات مختارة في التصنيع	الساعات العتمدة:3	نظري:3	عملي:0

المتطلب السابق: عمليات التصنيع (2)

تطرح المادة بمواضيع خاصة لها أهمية بنواحي مختلفة في التصنيع

57024306-3	هندسة البوليمرات واللدائن	الساعات العتمدة:3	نظري:3	عملي:0

المتطلب السابق: المواد الهندسية

مقدمة الى البوليمرات، المفاهيم الأساسية والمصطلحات، تصنيف البوليمرات، الوزن الجزيئي وتوزيع الوزن الجزيئي، استعراض أساسيات علوم البلاستيك والهندسة ، اختيار العملية، عملية تصميم المنتجات البلاستيكية واختيار المواد.

57024202-3	النمذجة السريعة والتصنيع الالكتروني	الساعات العتمدة:3	نظري:3	عملي:0

المتطلب السابق: التصميم والتصنيع بإستخدام الحاسب

يشمل المقرر المواضيع التالية: إنشاء نماذج CAD مناسبة، تكنولوجيا تصنيع النماذج الأولية السريعة الحالية، وتأثيرها على المجتمع، وسيتم توضيح عملية النمذجة الأولية السريعة من خلال التصميم الفعلي وتصنيع الأجزاء، عمليات التصنيع الرئيسية والمواد وتقنيات التعبئة والتغليف، والتصنيع الالكتروني، وسطح حمل التجميع وتصنيع لوحات الدوائر الالكترونية. كما سيتم تقديم لمحة عامة عن تصنيع أشباه الموصلات والإلكترونيات الضوئية

57024307-3	تصميم التجارب الصناعية	الساعات العتمدة:3	نظري:3	عملي:0

المتطلب السابق: الإحصاء الهندسي والاحتمالات

مبادئ التصميم التجريبي، طرق تحليل التباين الإحصائي، طرق التصميم الإحصائي، التصميم الإحصائي ذو المستويين، التصميم الإحصائي الناقص، الاختبارات المثلى للآلات والمواد، تطبيقات باستخدام الحاسب الآلي، استخدام تقنيات التحاليل الإحصائية لتوصيف النتائج

57024103-3	الطاقة المتجددة	الساعات العتمدة:3	نظري:3	عملي:0

المتطلب السابق: الموائع والعلوم الحرارية

مقدمة عن مصادر الطاقة المتجددة، التقنيات اللازمة لتسخير الطاقة في إطار مجموعة واسعة من أنظمة الطاقة المتقدمة. الموضوع

الخطة الدراسية

)السنة االولى)التحضيرية(: مجموع الساعات المعتمدة (32

الفصل الثاني — الفصل ألول

عملي	نظري	وحدة	المتطلب السابق	اسم المقرر	رقم المقرر	عملي	نظري	وحدة	المتطلب السابق	اسم المقرر	رقم المقرر
0	12	4	اللغة النجليزية	اللغة االنجليزية التقنية	48001701-4	0	16	6	----	اللغة النجليزية	48001700-6
3	2	3	---	مهارات برمجة الحاسب	48001503-3	3	3	4	----	كيمياء عامة	
0	4	4	)مقدمة في الرياضيات (1	)مقدمة في الرياضيات (2	48001401-4	0	4	4	----	)مقدمة في الرياضيات (1	48001400-4
3	3	4	----	)فيزياء عامة (1	48001300-4	0	6	3	----	مهارات التعلم	48001004-3
6	21			15 المجموع		3	29			17 المجموع	

)السنة الثانية: مجموع الساعات المعتمدة (33

الفصل الرابع

عملي	نظري	وحدة	المتطلب السابق	اسم المقرر	رقم المقرر
0	3	3	)مقدمة في الرياضيات (1	الجبر الخطي للمهندسين	57001002-3
0	2	2	---	مقدمة في الهندسة الصناعية	57021500-2
0	3	3	االحصاء الهندسي واالحتمالت	قياس وتحليل انظمة العمل	57021501-3
0	3	3	االحصاء الهندسي واالحتمالت	ادارة الافراد والمسسسات	57021400-3
3	2	3	)مقدمة في الرياضيات (2	)تحليل الدوائر (1	57031401-3
0	2	2	----	)القران الكريم (1	28011001-2
3	15	16	المجموع		

الفصل الثالث

عملي	نظري	وحدة	المتطلب السابق	اسم المقرر	رقم المقرر
0	3	3	)مقدمة في الرياضيات (2	إستاتيكا	57011105-3
3	3	4	)فيزياء عامة (1	)فيزياء عامة (2	57001005-4
5	1	2	-----	الرسم الهندسي	57021100-2
0	3	3	)مقدمة في الرياضيات (2	المعادالت التفاضلية للمهندسين	57001001-3
0	3	3	)مقدمة في الرياضيات (2	االحصاء الهندسي واالحتمالت	57002003-3
0	2	2	----	)الثقافة السالمية (1	28071001-2
8	15	17		المجموع	

السنة الثالثة: مجموع الساعات المعتمدة +35) التدريب الصيفي الول (36

الفصل السادس

عملي	نظري	وحدة	المتطلب السابق	اسم المقرر	رقم المقرر
3	2	3	المعادالت التفاضلية للمهندسين	الطرق الحسابية الهندسية	57003004-3
3	2	3	)تحليل دوائر (1	القياسات الهندسية	57022301-3
3	2	3	قياس وتحليل انظمة العمل	هندسة العوامل البشرية	57022502-3
3	2	3	المواد الهندسية	)عمليات التصنيع (1	57022302-3
0	3	3	ادارة الافراد والمسسسات	تخطيط االنتاج وضبط المخزون	57022504-3
0	2	2	)الثقافة السالمية (1	)الثقافة السالمية (2	28072001-2
12	13	17		المجموع	

الفصل الخامس

عملي	نظري	وحدة	المتطلب السابق	اسم المقرر	رقم المقرر
3	2	3	إستاتيكا	الموائع والعلوم الحرارية	57022101-3
0	3	3	إستاتيكا	الديناميكا واالهتزازات	57022102-3
3	2	3	كيمياء عامة	المواد الهندسية	57022300-3
3	2	3	الجبر الخطي للمهندسين	تطبيقات الحاسب في الهندسة الصناعية	57022200-3
0	3	3	االحصاء الهندسي واالحتمالت	)بحوث العمليات (1	57022006-3
0	1	1	اللغة النجليزية التقنية	التقارير الهندسية	57012106-1
0	2	2	)القران الكريم (1	)القران الكريم (2	28012001-2
9	15	18		المجموع	

)التدريب الصيفي االول 57023901-1)اجتياز 80 ساعة معتمده

السنة الرابعة: مجموع الساعات المعتمدة +32) التدريب الصيفي الول (33

الفصل الثامن

عملي	نظري	وحدة	المتطلب السابق	اسم المقرر	رقم المقرر
3	2	3	)عمليات التصنيع (2	التصميم والتصنيع باستخدام الحاسب	57023201-3
3	2	3	الديناميكا واالهتزازات	االتمتة والتحكم اآللي	57023304-3
3	2	3	الطرق الحسابية الهندسية	محاكاة النظم الصناعية	57023305-3
0	3	3	هندسة العوامل البشرية	هندسة االمن الصناعي	57023401-3
0	2	2	----	اللغة العربية	28021001-2
0	2	2	----	السيرة النبوية	28071002-2
9	13	16	المجموع		

الفصل السابع

عملي	نظري	وحدة	المتطلب السابق	اسم المقرر	رقم المقرر
3	2	3	)عمليات التصنيع (1	)عمليات التصنيع (2	57023303-3
0	3	3	)بحوث العمليات (1	)بحوث العمليات (2	57023007-3
3	2	3	الجبر الخطي للمهندسين	نظم المعلومات الصناعية	57023503-3
0	2	2	----	االقتصاد الهندسي	57011104-2
0	2	2	----	أخالقيات هندسية	57014101-2
0	3	3	)الثقافة السالمية (2	)الثقافة االسالمية (3	28073001-3
6	14	16	المجموع		

)التدريب الصيفي الثاني 57024902-1)اجتياز 120 ساعة معتمده

)السنة الخامسة: مجموع الساعات المعتمدة (31

الفصل العاشر

عملي	نظري	وحدة	المتطلب السابق	اسم المقرر	رقم المقرر
0	3	3	)مشروع التخرج (1	)مشروع التخرج (2	57024908-1
0	3	3	تخطيط االنتاج وضبط المخزون	الموثوقية وادارة الصيانة	57024403-3
0	3	3	ادارة المشاريع الصناعية	ضبط الجودة الصناعية	57024404-3
0	3	3	الوجستية وادارة سلسلة التوريد	تصميم وتخطيط المرافق	57024505-3
0	2	2	الثقافة السالمية (3	)الثقافة السالمية (4	28074001-2
0	2	2	)القران الكريم (2	)القران الكريم (4	28013001-2
0	16			المجموع 16	

الفصل التاسع

عملي	نظري	وحدة	المتطلب السابق	اسم المقرر	رقم المقرر
0	3	3	)التقارير الهندسية (1	)تصميم (2	57024909-3
0	3	3	تخطيط االنتاج وضبط المخزون	سلسلة التوريد	57024402-3
0	3	3	ادارة المشاريع الصناعية	الصناعية	57024405-3
0	3	3	ادارة الافراد والمسسسات	)	57024xxx-3
0	2	2	الثقافة السالمية (3	)الثقافة االسالمية (4	57024xxx-3
0	2	2	)القران الكريم (3	)القران الكريم (4	28014001-23
0	15	15		المجموع 16	

قسم الهندسة الصناعية
التوصـية : 1436
: عدد ساعات الخطة
165

جامعة ام القرى
كلية الهندسة بالقنفذة

التاريخ: 1437/5/14

المقررات االختيارية

مجموعة النظم واإلدارة الهندسية

رقم المقرر	اسم المقرر	المتطلب السابق	وحدة	نظري	عملي
57024903-3	موضوعات مختارة في اإلدارة الهندسية	ادارة المشاريع الصناعية	3	3	0
57024506-3	نمذجة وتصميم أنظمة االعمال	محاكاة النظم الصناعية	3	3	0
57024406-3	التخطيط االستراتيجي	ادارة المشاريع الصناعية	3	3	0
57024203-3	سيقما 6	الطرق الحسابية الهندسية	3	3	0
57024204-3	الذكاء الصطناعي	الجبر الخطي للمهندسين	3	3	0
57024008-3	اإلحصاء الهندسي المتقدم	اإلحصاء الهندسي واالحتماالت	3	3	0

مجموعة التصميم والتصنيع الهندسي

57024904-3	موضوعات مختارة في التصنيع	عمليات التصنيع	3	3	0
57024306-3	البوليمرات واللدائن الهندسية	المواد الهندسية	3	3	0
57024202-3	النمذجة السريعة والتصنيع اللكتروني	التصميم والتصنيع باستخدام الحاسب	3	3	0
57022200-3	تصميم التجارب الصاعية	اإلحصاء الهندسي واالحتماالت	3	3	0
57024103-3	الطاقة المتجددة	الموائع والعلوم الحرارية	3	3	0

متطلبات القسم		متطلبات الكلية		متطلبات الجامعة	

توصيف المقررات الدراسية

مقررات السنة الثانية

العدد المعتمد للساعات المعتمدة في السنة الثانية	رقم المقرر	اسم المقرر	الساعات نظري	الساعات الإجمالي	الساعات عملي	الساعات المعتمدة
الفصل الثالث						
3	57011105-3	استاتيكا	3	3	0	3
	57001005-4	فيزياء عامة)2	3	6	3	4
	57021100-2	الرسم الهندسي	1	6	5	2
	57001001-3	المعادلات التفاضلية للمهندسين	3		0	
	57002003-3	الإحصاء الهندسي والاحتمالات	3	3	0	3
	28071001-2	الثقافة السالميه)1	2	2	0	2
	الإجمالي					**17**
الفصل الرابع						
	57001002-3	الجبر الخطي للمهندسين	3	3	0	3
	57021500-2	مقدمة في الهندسة الصناعية	2	2	0	2
	57021501-3	قياس وتحليل انظمة العمل	3	3	0	3
	57021400-3	ادارة الافراد والمسسسات	3	3	0	3
	57031401-3	تحليل الدوائر)1	2	5	3	3
	2801101-2	القران الكريم)1	2	2	0	2
	الإجمالي					**16**

نظري:3 **الساعات المعتمدة : 3** **استاتيكا** 57011105-3

عملي:
0

المتطلب السابق: مقدمة في الرياضيات)2

جبر المتجهات، تحليل و جمع القوى، تكافس القوى المزدوجة، أنظمة القوى في الإنشاءات الهندسية، انظمة الاجسام الصلبة، خصائص القوى والعزوم والمحصالت، شروط التوازن،قوة الاحتكاك، خواص المقاطع)المراكز و عزوم القصور الذاتي.

عملي:3 **نظري:3** **الساعات المعتمدة:4** **فيزياء عامه)2** 57001005-4

المتطلب السابق: فيزياء (1)

الخصائص الكهربائية والضوئية والحرارية للمواد)بما في ذلك التركيب البلوري والترابط و نظرية الإلكترون الحر ،AC(و)DC القوانين و المفاهيم أساسية للكهرباء ،ونظرية الحزمة للمواد الصلبة وأشباه الموصالت(، مقدمة في المغناطيسية والضوء، بما في ذلك مفاهيم ميكانيكيا الكم الفيزياءالذرية والنووية ، المبادئ أساسية للحرارة الميكانيكا والحركة الموجية.

عملي:5 **نظري:1** **الساعات المعتمدة:2** **الرسم الهندسي** 57021100-2

المتطلب السابق: ------

مقدمة في أساسيات الرسم،انواع الخطوط، الرسومات ثنائية وثالثية أبعاد، المنظور الهندسي، رسم المساقط والمقاطع، الرسم الحر استخدام أأوتوكاد في الرسم الهندسي ثنائي وثالثي أبعاد.

Umm Al-Qura University
Engineering college at Alqunfdh
Date:15/04/1437

Department of Industrial Engineering
Year:1437 H
Credit Hours: 165

First Year (Preparatory Year): Total Cred. 32

First Semester

No.	Course Title	Prereq.	Cred.	lecture	Lab
48001700-6	English Language	----	6	16	0
	General Chemistry	----	4	3	3
48001400-4	Introduction to Math I	----	4	4	0
48001004-3	Learning Skills	----	3	6	0
Total			17	29	3

Second Semester

No.	Course Title	Prereq.	Cred.	lecture	lab
48001701-4	Technical English Language	48001700-6	4	12	0
48001503-3	Computer Programming Skills	----	3	2	3
48001401-4	Introduction to Math II	48001400-4	4	4	0
48001300-4	General Physics I	----	4	3	3
Total			15	21	6

Second Year (Freshman) Courses: Total Cred. 33

Third Semester

No.	Course Title	Prereq.	Cred.	lecture	Lab
57011105-3	Statics	48001401	3	3	0
57001005-4	General Physics II	48001300	4	3	3
57021100-2	Engineering Graphics	----	2	1	5
57001001-3	Differential Equations for Engineers	48001401	3	3	0
57002003-3	Engineering Statistics and Probability	48001401	3	3	0
28071001-2	Islamic Culture I	----	2	2	0
Total			17	15	8

Fourth Semester

No.	Course Title	Prereq.	Cred.	lecture	lab
57001002-3	Linear Algebra for Engineers	48001400	3	3	0
57021500-2	Introduction to Industrial Engineering	----	2	2	0
57021501-3	Work Systems Measurement and Analysis	57002003	3	3	0
57021400-3	Organizational and Human Resource Management	57002003	3	3	0
57031401-3	Circuit Analysis 1	48001401	3	2	3
28011001-2	Holly Quran I	----	2	2	0
Total			16	15	3

Third Year (Sophomore) Courses: Total Cred. 36

Fifth Semester

No.	Course Title	Prereq.	Cred.	lecture	Lab
57022101-3	Fluids and Thermal Sciences	57011105	3	2	3
57022102-3	Dynamics and Vibrations	57011105	3	3	0
57022300-3	Engineering Materials	General Chemistry	3	2	3
57022200-3	Computer Applications in Industrial Systems	57001002	3	2	3
57022006-3	Operations Research(1)	57002003	3	3	0
57012106-1	Engineering Reports	48001701	1	1	0
28012001-2	Holly Quran II	28011001	2	2	0
Total			18	15	9

Sixth Semester

No.	Course Title	Prereq.	Cred.	lecture	lab
57003004-3	Engineering Computational Methods	57001002	3	2	3
57022301-3	Engineering Measurements	57031401	3	2	3
57022502-3	Human Factors Engineering	57021501	3	2	3
57022302-3	Manufacturing Processes (1)	57022300	3	2	3
57022504-3	Production Planning and Inventory Control	57021400	3	3	0
28072001-2	Islamic Culture II	28071001	2	2	0
Total			17	13	12

Summer Training I (57023901-1) [pass 80 Cred.]

Fourth Year (Junior) Courses: Total Cred. 33

Seventh Semester

No.	Course Title	Prereq.	Cred.	lecture	Lab
57023303-3	Manufacturing Processes (2)	57022302	3	2	3
57023007-3	Operations Research(2)	57022006	3	3	0
57023503-3	Industrial Information Systems	57022200	3	2	3
57011104-2	Engineering Economy	----	2	2	0
57014101-2	Engineering Ethics	----	2	2	0
28073001-3	Islamic Culture III	28072001	3	3	0
Total			16	14	6

Eighth Semester

No.	Course Title	Prereq.	Cred.	lecture	lab
57023201-3	CAD/CAM	57023303	3	2	3
57023304-3	Automation and Control	57022102	3	2	3
57023305-3	Industrial Systems Simulation	57003004	3	2	3
57023401-3	Industrial Engineering Safety	57022502	3	3	0
28021001-2	Arabic Language	----	2	2	0
28071002-2	The Biography of Prophet Muhammad	----	2	2	0
Total			16	13	9

Umm Al-Qura University
Engineering college at Alqunfdh
Date:15/04/1437

Department of Industrial Engineering
Year:1437 H
Credit Hours: 165

Fifth Year (Senior) Courses: Total Cred. 31

Ninth Semester

No.	Course Title	Prereq.	Cred.	lecture	Lab
57024908-1	Senior Design Project I	57012106	1	1	0
57024402-3	Logistics and Supply Chain Management	57022504	3	3	0
57024404-3	Industrial Projects Management	57021400	3	3	0
57024xxx-3	Elective I	----	3	3	0
57024xxx-3	Elective II	----	3	3	0
28013001-2	Holly Quran III	28012001	2	2	0
Total			15	15	0

Tenth Semester

No.	Course Title	Prereq.	Cred.	lecture	lab
57024909-3	Senior Design Project II	57024908	3	3	0
57024403-3	Reliability and Maintenance Management	57022504	3	3	0
57024405-3	Industrial quality control	57024404	3	3	0
57024505-3	Facilities Planning and Design	57024402	3	3	0
28074001-2	Islamic Culture IV	28073001	2	2	0
28014001-2	Holly Quran IV	28013001	2	2	0
Total			16	16	0

Technical Electives

Industrial Management and Systems					
Course No.	Course title	Prereq.	Cred.	lecture	lab
57024903-3	Special Topics in Engineering Management	57024404	3	3	0
57024506-3	Business Systems Modeling and Design	57023305	3	3	0
57024406-3	Strategic Planning	57021400	3	3	0
57024203-3	Six Sigma	57003004	3	3	0
57024204-3	Artificial intelligence	57022006	3	3	0
57024008-3	Advanced Engineering Statistics	57002003	3	3	0
Design and Manufacturing					
57024904-3	Selected Topics in Manufacturing	57023303	3	3	0
57024306-3	Polymers and Plastics Engineering	57022300	3	3	0
57024202-3	Rapid Prototyping and E-Manufacturing	57023201	3	3	0
57024307-3	Design of Industrial Experiments	57022200	3	2	3
57024103-3	Renewable Energy	57022101	3	3	0

University Requirements College Requirements Department Requirements

Kingdom of Saudi Arabia
Ministry of Higher Education
Umm Al-Qura University

College of Engineering at Al-Qunfdh
Industrial Engineering Department

Umm Al-Qura University

Engineering College at Alqunfdh

College Profile and B. Sc. Plan in Industrial Engineering [Course Descriptions]

College Profile

The college of engineering was established in 2011 at Umm Al-Qura University campus at Alqunfdh governorate. The college offers undergraduate degrees across the untraditional engineering spectrum and in technology disciplines including construction engineering, industrial engineering, electronics and telecommunication and environmental engineering department.

Vision:

Toward a pioneer College in engineering education and applied research

Industrial Engineering Department

IE Program Mission:

To effectively contribute to the progress and development of the Saudi society, to meet its technical and administrative needs through enhancing the students' scientific and practical abilities, and to prepare them for the successful career paths in the industrial engineering field.

IE Program Educational Objectives (PEO):

The department select since its inception a number of objectives to build a better future in the changing world of tomorrow that may be achieved through five years, most notably the following:

- Provide the studenta high level of knowledge in the field of industrial engineering, and the ability to use the right modern technologies and engineering tools skilfully.
- Produce industrial engineering leaders who design and improve local processes in industry, business, and government sectors.
- Encourage research activities and prepare research facilities for substantive research in key areas of the program, which are appropriate to institutional and community needs.
- Strengthties of cooperation with the community with the aim of promoting common inte rests.
- Provide employers with technically qualified graduates with basic management and perso nal skills, the ability to grow professionally and develop their careers.

ABET Students Learning Outcomes (CLO):

a. An ability to apply knowledge of mathematics, science and engineering appropriately to the discipline
b. An ability to design and conduct experiments, analyze and interpret data
c. An ability to design a system, component, or process to meet the desired needs
d. An ability to function on multidisciplinary teams
e. An ability to identify, formulate and solve engineering problems
f. An understanding of professional and ethical responsibilities
g. An ability to communicate effectively
h. Acquisition of the broad education necessary to understand the impact of engineering solutions in a societal context
i. A recognition of the need for, and an ability to engage in lifelong learning
j. Knowledge of contemporary issues
k. An ability to use the techniques, skills and modern engineering tools necessary for engineering practice

Labs and Facilities:

- Metrology and measurement laboratory:

Measurements with different micrometres & vernier measuring instruments, angular measurements, measuring tapered work pieces, measuring & checking dove tails, fixed, type gauges, checking for taper, roundness & concentricity of cylindrical work pieces, tool maker's microscope, optical projectors, wear in cutting tools , machine tools metrology, surface measurements. English technical report writing is also emphasized in this course

- CAD/CAM laboratory:

Include 25 P4 computers supported with different drawing and design software's for example: AutoCAD, Mechanical desktop, Pro/Engineer and other packages like Mat lab, Minitab, Areana...etc. it includes computer units and programs to develop product design and manufacturing programs. In addition, it includes equipment's for reverse engineering and rapid prototyping.

- Engineering Materials laboratory:

Tensile testing, Impact testing, hardness testing, fatigue testing, creep testing, metallography I, metallography II, coring effects, cold working effects, annealing, precipitation hardening, NDT Testing

- Manufacturing technology laboratory:

It includes traditional production machines; material cutting (lathes, milling, grinding, sawing…etc.), material forming machines (presses), non-traditional machines (electro chemical,

laser…etc.), and plastic injection machine. Sand casting, special casting processes cold working and heat treatment, gas welding, electric arc welding, sheet metal forming and press working

- Computer numerical control laboratory:

It includes digital controlled machine tools.

- Industrial control laboratory:

It includes industrial control systems using digital means (computer), actuators, and sensors to control and automate production machines, equipment's and systems.

- Computer integrated manufacturing laboratory:

It includes integrated units of manufacturing system and robotics.

- Industrial system analysis and simulation laboratory:

It includes computer units and programs to carry analysis and simulation of systems and its operations.

- Human factors and work study laboratory:

It includes apparatuses for measuring human stress, capability and performance. In addition, it includes measuring instrumentation of human dimension, work time, work measurement techniques, work sampling, standard basic times, information processing using sensory inputs and memory. Display and control design to improve efficiency and safety. Ergonomic design of work place based on anthropometric data. Work physiology environment.

- Virtual reality and augment laboratory:

It includes virtual work apparatuses, computers, and programs for designing, operating, and maintenance of production system and products through virtual reality.

Admission Requirements

Admission in industrial Engineering program is offered through a process initiated in Umm Al-Qura University. The students first have to take the compulsory preparatory year courses in University college. The following is the minimum requirements for the acceptance in Preparatory Year:

- The number of accepted students must not exceed the number specified by the University Council.
- Accepted students are ordered descending by their Composite Rate which is calculated as follows:
- 30% General Aptitude Test (GAT).
- 50% Grade Point Average (GPA) of High School degree.
- 20% Scholastic Achievement Admission Test (Science).

After completing the Preparatory Year program, students are offered admission at the IE program in College of Engineering in Al- Qunfudah according to three main criteria, student choice, student's GPA in Preparatory Year program, and capacity of the requested academic section. In order to be accepted at

the IE program, students are expected to obtain at least 70% in their Composite Rate, which is calculated as follows:

- 25% General Aptitude Test (GAT).
- 25% The Cumulative Average of The Preparatory Year.
- 25% Scholastic Achievement Admission Test (Science).
- 25% Results of math-140 and math-150 modules in Preparatory Year program.

Program for Industrial Engineering Department
"Course Description"

Second Year (freshman) Courses: Total Credits 33

Third Semester					
			Hours		
Course No	Course Title	Prerequisite	Credit	lecture	Lab
57011105-3	Statics	48001401	3	3	0
57001005-4	General Physics II	48001300	4	3	3
57021100-2	Engineering Graphics	---	2	1	5
57001001-3	Differential Equations for Engineers	48001401	3	3	0
57002003-3	Engineering Statistics and Probability	48001401	3	3	0
28071001-2	Islamic Culture I	-----	2	2	0
		Total	**17**	**15**	**8**
Fourth Semester					
57001002-3	Linear Algebra for Engineers	48001400	3	3	0
57021500-2	Introduction to Industrial Engineering	----	2	2	0
57021501-3	Work Systems Measurement and Analysis	57002003	3	3	0
57021400-3	Organizational and Human Resource Management	57002003	3	3	0
57031401-3	Circuit Analysis 1	48001401	3	2	3
28011001-2	Holly Quran I	----	2	2	0
		Total	**16**	**15**	**3**

57011105-3 **Statics** Credit hours:3 Lectures:3 Lab: 0

Prerequisite: Introduction to Math II

Vector algebra, forces composition and resolution, equivalence of couple systems, force systems on engineering structures, systems of rigid bodies, properties of forces, moments, couples and resultants, equilibrium conditions, frictional forces, section properties (centroids, moments of inertia).

57001005-4 **Physics II** Credit hours:4 Lectures:3 Lab:3

Prerequisite: Physics I

Fundamental laws and phenomena of electricity (DC and AC), electrical, optical and thermal properties of materials (including crystal structure and bonding, free electron theory, band theory of solids and semiconductors), introduction to magnetism and light, quantum mechanical concepts; atomic and nuclear physics, fundamental principles of mechanics, heat and wave motion. Lab sessions and experiments

57021100-2	**Engineering Graphics**	Credit hours:2	Lectures: 1	Lab:5

Prerequisite: ---

Introduction to drawing basics, types of lines, 2D and 3D manual drawings, isometric and pictorial drawing, orthographic views, sections and free hand sketch skills, Using Auto-Cad software for 2D and 3D engineering drawing

57001001-3	**Differential Equations for Engineers**	Credit hours:3	Lectures:3	Lab: 0

Prerequisite: Introduction to Math II

Basic concepts of ordinary differential equation, general and particular solutions, initial and boundary conditions, linear and nonlinear differential equations, solution of first and second order differential equations and their applications, higher order differential equations, theory of operators and applications, introduction to partial differential equations.

57002003-3	**Engineering Statistics and Probability**	Credit hours:3	Lectures:3	Lab: 0

Prerequisite: Introduction to Math II

The role of statistics in engineering, discrete random variables and probability distributions, descriptive statistics, statistical intervals, sampling distributions, sampling distributions, testing hypothesis, goodness of fit and contingency tables, experimental design, regression analysis, computer applications.

57001002-3	**Linear Algebra for Engineers**	Credit hours:3	Lectures:3	Lab: 0

Prerequisite: Introduction to Math I

Basic matrix algebra including matrices, inverses, linear systems, determinants, Eigen-values, Eigenvectors, vector spaces, solution of linear systems and Gaussian elimination, linear transformations, computer applications in linear algebra.

57021500-2	**Introduction to Industrial Engineering**	Credit hours:2	Lectures:2	Lab: 0

Prerequisite: ----

Introduction to engineering design, the design process, defining the client design problem, IE functions and requirements, generating and evaluating design alternatives, An introduction to an overview of the profession, including career planning, professionalism and communication, ethics, teamwork, industry site visits, industrial speakers, engineering design process and selected solution methods for problems in coordination and planning.

57021501-3	**Work Systems Measurement & Analysis**	Credit hours:3	Lectures: 3	Lab: 0

Prerequisite: Engineering Statistics and Probability

Study of manufacturing and service methods and processes, analytical techniques of process flow and efficiency, Motion and Time Study (MTS), work methods and standards, time measurements, project.

57021400-3	**Organizational and Human Resource Management**	Credit hours:3	Lectures:3	Lab:0

Prerequisite: Engineering Statistics and Probability

This course provides a comprehensive analysis of individual and group behavior in organizations, Its purpose is to provide an understanding of how organizations can be managed more effectively and at the same time enhance the quality of employees work life, Topics include motivation, rewarding behavior, stress, individual and group behavior, conflict, power and politics, leadership, job design, organizational structure, decision making, communication and organizational change and development, Organization, Design & Control, The changing role of human resource managers in a competitive environment is analyzed and students are introduced to a variety of practical skills through role-plays, class discussions, and case work,

57031401-3	**Circuit Analysis 1**	Credit hours:3	Lectures:2	Lab: 3

Prerequisite: Introduction to Math II

This course covers basic circuit theory including the AC and DC characteristics of resistors, capacitors and inductors as used in elementary single and three-phase circuits. Characteristics of basic industrial electric motors and single and three-phase connections are studied. Basic factory automation is covered including sensors, relay control and programmable logic controllers. Laboratory exercises supplement the material discussed in class,

Third Year (Sophomore) Courses: Total Credits 36

Fifth Semester					
			Hours		
Course No.	**Course Title**	**Prerequisite**	**Credit**	**lecture**	**Lab**
57022101-3	Fluids and Thermal Sciences	57011105	3	2	3
57022102-3	Dynamics and Vibrations	57011105	3	3	0
57022300-3	Engineering Materials	General Chemistry	3	2	3
57022200-3	Computer Applications in Industrial Systems	57001002	3	2	3
57022006-3	Operations Research-1	57002003	3	3	0
57012106-1	Engineering Reports	48001701	1	1	0
28012001-2	Holly Quran II	28011001	2	2	0
		Total	**18**	**15**	**9**
Sixth Level					
57003004-3	Engineering Computational Methods	57001002	3	2	3
57022301-3	Engineering Measurements	57021103	3	2	3
57022502-3	Human Factors Engineering	57021501	3	2	3
57022302-3	Manufacturing Processes (1)	57022300	3	2	3
57022504-3	Production Planning and Inventory	57021400	3	3	0
28072001-2	Islamic Culture II	28071001	2	2	0
57023901-1	Summer Training I	**pass 80 credits**	1	-	-
		Total	**18**	**13**	**12**

57022101-3	**Fluids and Thermal Sciences**	Credit hours:3	Lectures:2	Lab:3

Prerequisite: Statics

The course covers fluid properties, flow classifications, fluid statics, conservation of mass equations, conservation of momentum equations, and conservation of energy equations. The course also covers properties of pure substances, P-V-T phase diagrams, property tables, first and second law of thermodynamics, one-dimensional steady-state conduction, free convection, and radiation heat transfer.

Fluid Thermal Science Lab

The lab includes experimental analysis of fluid flow, heat transfer, and thermodynamic systems.

57022102-3	**Dynamics and Vibrations**	Credit hours:3	Lectures:3	Lab: 0

Prerequisite: Statics

The course covers planar kinematics of rigid bodies, relative motion analysis of velocity and acceleration, planar kinetics of rigid bodies: force and acceleration, work and energy methods. The course also includes an introduction to free vibrations: harmonic motion, viscous damping, response to harmonic excitation of undamped and damped systems, and forced vibrations.

57022300-3	**Engineering Materials**	Credit hours:3	Lectures:2	Lab: 3

Prerequisite: General chemistry

The course covers atomic structure and bonding, structure of materials (metal, polymer, ceramics, and composites), elastic and plastic deformation, solution hardening, dispersion hardening, introduction to phase diagrams, ferrous and non-ferrous metals (steel, cast iron, aluminium and copper), and an introduction to advanced materials,

Engineering Materials Lab,

The lab includes experiments on tensile, hardness, fatigue, impact, and creep tests, macro and micro-examination of materials, effect of cold working and heat treatment on metals, hardening and tempering of steel, Jiminy test, Carburizing of low carbon steel, and Non-destructive tests

57022200-3	**Computer Applications in Industrial Systems**	Credit hours:3	Lectures:2	Lab: 3

Prerequisite: Linear Algebra for Engineers

Computer structured programming using language C, structured and user-defined data types, simple and complex structures declaration, condition and repetition structures, functions and procedures, basic libraries, dynamic memory allocation, introduction to object-oriented and visual programming, Basic applications and samples for Industrial Engineering.

57022006-3	**Operations Research-1**	Credit hours:3	Lectures:3	Lab: 0

Prerequisite: Engineering Statistics and Probability

Mathematical modelling and operations research, linear programming, simplex algorithm, duality, transportation and assignment problems, network models

57012106-1	**Engineering Reports**	Credit hours:1	Lectures:1	Lab: 0

Prerequisite: Technical English Language

Research methodology concepts and definition, research ethics, problem identification, research plan preparation, data gathering and collection, data presentation and analysis, design of research report, principles and procedures of engineering reports writing; organizing information, and writing specialized forms such as abstracts, instructions, and proposals, formal Email writing,

57003004-3	**Engineering Computational Methods**	Credit hours:3	Lectures:2	Lab:3

Prerequisite: Differential Equations for Engineers

Introduction to Numerical Methods, Roots of non-linear equations, linear systems of equations: matrix methods, Gaussian elimination, Gauss-Seidel, ill–conditioning, Errors: Sources, estimates, propagation, floating point arithmetic, curve fitting and interpolation,, numerical solution of differential equations, finite difference, Euler and Runge-Kuta methods, Lab sessions,

57022301-3	**Engineering Measurement**	Credit hours:3	Lectures:2	Lab:3

Prerequisite: Engineering graphics

Precision measurement, Statistical process control and quality assurance using manual and automated gauges, checking fixtures, non-destructive testing, and coordinate measuring systems, Use of vision, laser, and other non-contact measuring systems, Errors, linear, angular and contour measurements, Fits and tolerances: inter changeability, ISO shaft and hole systems of fits and tolerances, Thread metrology, Gear metrology; surface texture, out of roundness and flatness measurements, Flow and temperature measurements, force, torque and strain measurements, design of load cells

Engineering Measurements Lab

Experiments on alignment, angular measurements, diameters, surface roughness, out of roundness, screws, gears, thermocouples and oscilloscope

57022502-3	**Human Factors Engineering**	Credit hours:3	Lectures:2	Lab:3

Prerequisite: Work Systems Measurement & Analysis

Introduction to human factors Engineering, Muscular work, Nervous control, Work efficiency, Body size and anthropometrics, Work station design, Heavy work, Handling loads, Man-machine systems, Mental activity, Fatigue, Stress and boredom, Vision and lighting, Noise and vibration.

Human Factors Engineering Lab

The lab include: anthropometric measurements, application of anthropometric data in workstation design, vision testing, strength measurements, audiometry, reaction time, physical work capacity through heart rate and oxygen consumption, & manual material handling.

57022302-3	**Manufacturing Processes (1)**	Credit hours:3	Lectures:2	Lab: 3

Prerequisite: Engineering materials

The course includes an introduction to manufacturing processes with a focus on metal casting, rolling, forging, extrusion, drawing, machining, and joining (welding, brazing, soldering, adhesive bonding, and mechanical fastening).

Manufacturing Processes (1) Lab

The lab include metal forming methods and mechanical tests

57022504-3	**Production Planning and Inventory Control**	Credit hours:3	Lectures:3	Lab: 0

Prerequisite: Organizational and Human Resource Management

Basic concepts of Production and Operations Management (POM), design of products and services, processes and technologies, E-commerce and operations management, inventory management, supply-Chain management, just-in-time and lean production, forecasting, Material Requirements Planning (MRP), introduction to Enterprise Requirement Planning (ERP), capacity and aggregate planning, Scheduling.

57023901-1	**Summer training I**	Credit hours:1	Lectures: 0	Lab: 0

Prerequisite: achieving 80 credit hours,

Field training conducted under the supervision of a college member; the student must submit a detailed technical report by the end of the training period, explaining what he learned during the training,

Fourth Year (Junior) Courses: Total Credits 33

Seventh Semester					
			Hours		
Course No,	Course Title	Prerequisite	Credit	lectur	Lab
57023303-3	Manufacturing Processes(2)	57022302	3	2	3
57023007-3	Operations Research (2)	57022006	3	3	0
57023503-3	Industrial Information Systems	57001002	3	2	3
57011104-2	Engineering Economy	----	2	2	0
57014101-2	Engineering Ethics	----	2	2	0
28073001-3	Islamic Culture III	28072001	3	3	0
		Total	**16**	**14**	**6**
Eighth Semester					
57023201-3	CAD/CAM	57023302	3	2	3
57023303-3	Automation and Control	57022102	3	2	3
57023305-3	Industrial Systems Simulation	57001004	3	2	3
57023401-3	Industrial Engineering Safety	57022502	3	3	0
28021001-2	Arabic Language	----	2	2	0
28071002-2	The Biography of Prophet Muhammad	----	2	2	0
57024902-1	Summer Training II	pass 120 credits	1	-	-
		Total	**17**	**13**	**9**

57023303-3 **Manufacturing Processes(2)** Credit hours:3 Lectures:3 Lab:0

Prerequisite: Manufacturing Processes(1)

Machining processes: Conventional machining processes, Single-point cutting, Multiple-point cutting, Tool geometry, Chip formation, Chip types, Cutting dynamics: Chip formation, Chip types, Cutting forces, Shear angle vs. shear stress, tool materials, tool life, cutting tool materials, Non-traditional machining processes, Mechanical energy processes - electrochemical machining processes - thermal energy processes - chemical machining – Lazer – compressive fluids- compressive air with abrasive materials

Manufacturing Technology Lab

Laboratory experiments dealing with basic material processing operations. Fits and tolerances

57023007-3 **Operations Research-2** Credit hours:3 Lectures:3 Lab: 0

Prerequisite: Operations Research-1

Probabilistic and stochastic models used in industrial engineering systems: Markov processes, stochastic processes, queuing and their applications, Discrete and continuous processes

57023503-3	**Industrial Information Systems**	Credit hours:3	Lectures:2	Lab: 3

Prerequisite: Linear Algebra for Engineers

General concepts, Values and attributes of information, Different types of information systems, Concepts of managerial information systems, Analysis, design and development of industrial information systems, Developing information systems by using microcomputers.

57011104-2	**Engineering Economy**	Credit hours:2	Lectures:2	Lab: 0

Prerequisite: Engineering Statistics and Probability

The course covers cost concepts, time value of money, interest formulas, cash flow and equivalence calculations, inflation and taxation, measures of investment worth, projects evaluation, depreciation, break-even analysis, and replacement analyses.

57014101-2	**Engineering Ethics**	Credit hours:2	Lectures:2	Lab: 0

Prerequisite: Introduction to Industrial Engineering

Introduction, laws, regulations and codes governing professional practice, responsibilities and liabilities, environmental legislation, social impacts of engineering services, relations between engineer, client and general public with regards to moral issues and ethics in Islam, Contemporary applications

57023201-3	**Computer Aided Design and Manufacturing (CAD&CAM)**	Credit hours:3	Lectures:2	Lab:3

Prerequisite: Manufacturing Processes (2)

Fundamentals of computer aided engineering and design, CAD applications, Geometric modelling, Engineering analysis and finite element technique, Fundamentals of computer aided manufacturing, CNC concepts and part programming, CAD / CAM integration,

CAD&CAM Lab

The lab covers 3D modelling utilizing different CAD software packages, Drawing of key mechanical elements, Mechanical assembly, Projected and sectional views, Drawing documentation, and Practical implementations of learned CAD techniques in team project, CAD / CAM integration, CNC

57023304-3	**Automation and Control**	Credit hours:3	Lectures:2	Lab: 3

Prerequisite: Dynamics and Vibrations

The course covers an introduction to linear feedback control theory, mathematical modelling of physical systems, transfer functions, block diagrams and signal flow graph, time domain analysis of control systems, test signals, transient response, time domain specifications, steady-state error and stability, The course also covers sensors, actuators, A/D and D/A conversion, hydraulic and pneumatic systems, Programmable Logic controllers (PLCs) and Computer Integrated Manufacturing (CIM),

Control and Automation Lab,

The lab includes experiments and practical training on control of mechanical systems using P/PD/PID Controllers, control of X-Y table using stepper motors, developing ladder logic programs for PLCs, pneumatic control and servo control systems, control system implementation using related engineering software applications such as Matlab, Lab view, and Simulink, identifying different types of sensors, and CIM (Robotics, Conveyor, and Machine Tools)

57023305-3	**Industrial Systems Simulation**	Credit hours:3	Lectures:2	Lab: 3

Prerequisite: Engineering Computational Methods

Systems simulation structure, conceptual models; generation of random numbers and random variables; system simulation languages, model verification and validation, design of experiments for simulation runs, output analysis; applications to industrial situations,

Industrial Systems Simulation Lab

The course contains a team simulation project and a lab teaching a higher-level language, Guest lecturers from industry will provide their views of practical project management

57023401-3	**Industrial Engineering Safety**	Credit hours:3	Lectures:3	Lab: 0

Prerequisite: Human Factors Engineering

Study of hazards in the workplace, analytical tools of hazards and accidents, probabilistic concepts, safety and health syloms, national regulations and requirements, hazard control, safety and health management syloms

57024902-1	**Summer training II**	Credit hours:1	Lectures: 0	Lab: 0

Prerequisite: achieving 120 credit hours

Field training conducted under the supervision of a college member; the student must submit a detailed technical report by the end of the training period, explaining what he learned during the training,

Fifth Year (Senior) Courses: Total Credits 31

Ninth Semester					
			Hours		
Course No,	Course Title	Prerequisite	Credit	lecture	Lab
57024908-1	Senior Design Project I	57012106	1	1	0
57024402-3	Logistics and Supply Chain Management	57022504	3	3	0
57024404-3	Industrial Projects Management	57021400	3	3	0
57024xxx-3	Elective I	----	3	3	0
57024xxx-3	Elective II	----	3	3	0
28013001	Holly Quran III	28012001	2	2	0
		Total	**15**	**15**	**0**
Tenth Semester					
57024909-3	Senior Design Project II	57024908	3	3	0
57024403-3	Reliability and Maintenance Management	57022504	3	3	0
57024405-3	Industrial Quality Control	57024404	3	3	0
57024505-3	Facilities Planning and Design	57023402	3	3	0
28074001-2	Islamic Culture IV	28073001	2	2	0
28014001-2	Holly Quran IV	28013001	2	2	0
		Total	**16**	**16**	**0**

Senior Design Project I

Credit hours:1 | Lectures:1 | Lab: 0

Prerequisite: Engineering Reports, CAD/CAM

A group of students is required to prepare a proposal, review relevant literature, develop a work plan, acquire data, conduct preliminary design and feasibility studies and evaluate alternatives in preparation for Senior Design Project II, Teams are also required to submit and present technical progress report, Teams are also required to submit and present technical progress report,

57024402-3 Logistics and supply chain management

Credit hours:3 | Lectures:3 | Lab: 0

Prerequisite: Production Planning and Inventory Control

The focus will be on the design, planning, organization and control of the associated activities, The following topics will be covered: supply chain structure, objectives and evaluation drivers and metrics, network design and facility location in a supply chain, demand and sales forecasting, aggregate planning, planning and managing inventory in a supply chain, transportation operations, sourcing and procurement, pricing, and information technologies in supply chain management,

57024404-3	**Industrial Projects Management**	Credit hours:3	Lectures:3	Lab: 0

Prerequisite: Industrial Engineering Safety, Organizational and Human Resource Management

The course is focused on planning and control activities in contract-based projects and change projects in several industrial areas, The established project management theory is compared to a number of cases, Starting by providing a basic understanding of the project management discipline and profession, the course goes on to topics such as project planning, project organising, and management control and project leadership, Comprehensive integrated planning for all the activities required for project success using the project life cycle, Gantt chart, activity on arrow, activity on node for scheduling time, expenditure, and resources, Time/Cost analysis and resource allocation

57024909-3	**Senior Design Project II**	Credit hours:3	Lectures:3	Lab: 0

Prerequisite: Senior Design Project I

In continuation of Senior Design Project I, the teams work out a complete analysis and design of their projects, Each student in the team is expected to handle a specific task of the project and coordinate his work with the rest of the group, Each team is required to submit its preliminary design with all necessary documents and drawings, At the end of the course, each team is required to deliver a final presentation

57024403-3	**Reliability and Maintenance Management**	Credit hours:3	Lectures:3	Lab: 0

Prerequisite: Organizational and Human Resource Management

Reliability in design, reliability models, reliability assessment during pre-production development and testing, and special problems in maintenance, spare parts, and Markov processes, M&O organization, M&O strategy, forecasting M&O work, maintenance capacity planning, component replacement decision models, maintenance measurement and standards, scheduling of maintenance, material control, quality of M&O jobs, M&O productivity, maintenance audit, M&O management information systems, case studies,

57024405-3	**Industrial quality control**	Credit hours:3	Lectures:3	Lab: 0

Prerequisite: Industrial Projects Management

Introduction to quality systems, cost of quality, Total quality management: quality systems and standards: six sigma and ISO, reengineering. Statistical quality control: control charts for variables and attributes, process capability analysis, acceptance sampling plans, quality function deployment, quality circles, quality loss functions.

57024505-3	**Facilities Planning and Design**	Credit hours:3	Lectures:3	Lab: 0

Prerequisite: Logistics and supply chain management

Strategic facilities planning, location selection, product, process and schedule design, flow, space and activity relationships, personnel requirements, material handling systems (MHS), layout, Computer-Aided Layout, warehouses, design project

Technical Electives

Industrial Management and Systems

57024903-3	**Special Topics in Engineering Management**	Credit hours:3	Lectures:3	Lab: 0

Prerequisite: Industrial Projects Management

Course offered in special topics related to general areas of interest in engineering management

57024506-3	**Business Systems Modeling and Design**	Credit hours:3	Lectures:3	Lab: 0

Prerequisite: Industrial Systems Simulation

This course covers: The development, implementation, and utilization of business models for managerial decision-making, Various techniques for analytical modeling, such as forecasting, optimization, simulation, decision analysis, and classification, are discussed, The concepts and tools that support and define the, information Systems, design and development process

57024406-3	**Strategic Planning**	Credit hours:3	Lectures:3	Lab: 0

Prerequisite: Organizational and Human Resource Management

Nature of strategic planning, development of a strategic plan, setting vision, mission, and objectives, external evaluation, internal evaluation, analysis and selection of alternatives, strategy implementation, strategy review and evaluation,

57024203-3	**Six Sigma**	Credit hours:3	Lectures:3	Lab: 0

Prerequisite: Engineering Computational Methods

Six Sigma comprises two frameworks-DMAIC (define, measure, analyse, improve, control) and DMADV (define, measure, analyse, design, verify). This course will cover both lean productions, Forecasting, Material Requirements Planning (MRP), Introduction to Enterprise Requirement Planning (ERP), Capacity and Aggregate planning, Scheduling

57024204-3	**Artificial intelligence**	Credit hours:3	Lectures:3	Lab: 0

Prerequisite: Operations Research(1)

Artificial intelligence (AI) studies how to realize the intelligent human behaviors on a computer. AI is to make a computer/machine capable to learn, plan, and solve problems autonomously. The ccourse covers: problem solving, reasoning based on cases and experiences, planning, automatic programming, machine learning, knowledge-basis management, expert systems, pattern recognition, fuzzy logic, Bayesian and neural networks, genetic and evolutionary algorithms for optimal decision solving. Further, both natural language understanding and computer vision can be solved using methods developed in the field of pattern recognition.

57024008-3	**Advanced Engineering Statistics**	Credit hours:3	Lectures:3	Lab: 0

Prerequisite: Engineering Statistics and Probability

This course focuses on advanced statistics methods including the specification and estimation of the linear regression model, Gauss-Markov assumptions, serial correlation, and errors in variables, hypothesis tests and specific quantitative tests, econometrics of Panel Data and Time Series Analysis. The course covers also multivariate techniques in management engineering, and applies aspects of quantitative data analysis; including model testing, decision theory.

Design and Manufacturing

57024904-3	**Special Topics in Manufacturing**	Credit hours:3	Lectures:3	Lab: 0

Prerequisite: Manufacturing Processes (2)

Course offered in special topics related to general areas of interest in manufacturing,

57024306-3	**Polymers and Plastics Engineering**	Credit hours:3	Lectures:3	Lab: 0

Prerequisite: Engineering Materials

Introduction to polymers, basic concepts and terminology, classification of polymers, molecular weight & molecular weight distribution, review of plastic science and engineering fundamentals, process selection, the plastic product design process and material selection

57024202-3	**Rapid Prototyping and E-Manufacturing**	Credit hours:3	Lectures:3	Lab: 0

Prerequisite: CAD/CAM

The course covers the following topics: the generation of suitable CAD models, current rapid prototyping fabrication technologies, and the impact of these technologies on society, The rapid prototyping process will be illustrated by the actual design and fabrication of a part, The major manufacturing processes, materials, and technologies of electronics packaging, surface mount assembly and printed circuit board fabrication, Overview of semiconductor manufacturing and optoelectronics packaging will also be presented

57024307-3	**Design of Industrial Experiments**	Credit hours:3	Lectures:3	Lab: 0

Prerequisite: Engineering Statistics and Probability

Principles of experimental design, randomized complete block designs, Latin square and Greco-Latin square designs, General factorial designs, 2k Factorial designs, response surface methodology and robust design, planning, performing and analyzing industrial experiments

57024103-3 **Renewable Energy** Credit hours:3 Lectures:3 Lab: 0

Prerequisite: Fluids and Thermal Sciences

This subject is designed for students by providing an introduction to the most important renewable energy resources and the technologies for harnessing these within a framework of a broad range of simple to state-of-the-art advanced energy systems. The subject helps students understand society's present needs and future energy demand by examining both conventional and renewable energy technologies including fossil fuels, nuclear power, solar energy, wind power, biomass energy, hydropower, geothermal energy, etc. and foster the ability to engage in lifelong learning on renewable energy (RE) issues. Unlike fossil fuels, renewable energy sources are sustainable

UMM AL-QURA UNIVERSITY
ENGINEERING COLLEGE AT ALQUNFDH

COURSE SYLLABI

INDUSTRIAL ENGINEERING PROGRAM

Course Title				
Course No.		Credit hours:3	Lectures:3	Lab: 0
Prerequisite	Introduction to Math II			
Course Description	Vector algebra, forces composition and resolution, equivalence of couple systems, force systems on engineering structures, systems of rigid bodies, properties of forces, moments, couples and resultants, equilibrium conditions, frictional forces, section properties (centroids, moments of inertia).			
Textbook	Engineering Mechanics: Statics, Hibbeler, R. C., Prentice Hall, 2009			
Objectives'	By the completion of the course, the student should be able to: - Determine the resultant of a system of concurrent forces by parallelogram methods and Cartesian vector notation in 2D& 3D (magnitude and direction), - Apply and solve equations of equilibrium for a particle and a rigid structure in 2D& 3D, - Calculate the moment of a force about a point and a line and the moment of a couple in 2Dand 3D (magnitude and vector), - Reduce a system of forces and couples to a single force and determine its point of application and - Determine section properties, (area, and centroid, first and second moment of area).			

Outline and Duration	**Topic**	**Duration (weeks)**
	1. General Principles	2
	2. Force Vectors	2
	3. Equilibrium of a Particle	2
	4. Force System Resultants	2
	5. Equilibrium of a Rigid Body	2
	6. Equilibrium in Two and three Dimensions	2
	7. Section properties	2
	Total	**14**

Class Schedule	Three lecture sessions per week, 50 minutes each.
Contribution to Professional Components	Math & Basic Sciences 33% Engineering Topics 67%

Grade Distribution	Homework	Quizzes	Midterm exam	Lab	Team project	Final
	15 %	15%	30%	-	-	40%

Course Relationship to Program Outcome	**Program outcome**	**ABET Outcomes**										
		a	b	c	d	e	f	g	h	i	j	k
	Key	x		x	x	x						x

	57021100-2	Credit hours:2	Lectures:1	Lab:5

	Introduction to drawing basics, Types of lines, 2D and 3D manual drawings, isometric and pictorial drawing, orthographic views, sections and free hand sketch skills. Using Auto-Cad software for 2D and 3D engineering drawing.			
	1. Principles of Engineering Drawing, Thomas E.French, McGraw-Hill Higher Education,"14th ed., 2003 2. AutoCAD 2013 and AutoCAD LT 2013 Essentials, Scott Onstott, wiley.			
	Upon completion of this course students will be able to understand: - What are the different types of engineering drawings - What are the standard engineering drawing formats - How to interpret the symbols in the drawings - How to communicate dimensions properly - How to identify and interpret the line conventions used on engineering drawings - What are the common terms, symbols, legends, notes and abbreviations used on engineering drawings - How to interpret the various views shown on engineering drawings and to identify an object - form an orthographic drawing Engineering			

	Topic	**Duration (weeks)**
	1. Drawing Equipment (T-Square, Set of Squares, protractor, compass, Board clips, ruler	1
	2. Drawing principles (line types, sheet sizes, Title blocks, Drawings scales	1
	3. Geometric construction (Geometric construction on lines, arcs and scales	1
	4. First angle and third angle Projections	1
	5. Pictorial projection (pictorial presentation of point, line and surface, and solids.	1
	6. Multi-views projection (Projection – Views of point, Views of solids-Layout of views) & Exercises.	1
	7. Isometric and oblique sketching of solids	1
	8. Extracting the missing View from given views.	1
	9. Sectioning and section View	2
	10. Auto CAD applications	4
	Total	**14**
	One-lecture sessions per week, 50 minutes each plus 5 hours in the drawing lab	

Contribution to Professional Components		Math & Basic Sciences 0 % Engineering Topics 100%									
Grade Distribution	Homework	Quizzes	Midterm exam		Lab	Team project	Final				
	10%	10%	20%		20%	-	40%				
Course Relationship to Program Outcome	**Program outcome**	**ABET Outcomes**									
		a	b	c	d	e	f	g	h	i	j	k
	Key				x		x	x				x

Course Title	**Differential Equations for Engineers**			
Course No.	**57001001-3**	Credit hours:3	Lectures:3	Lab: 0
Prerequisite	Introduction to Math II			
	Basic concepts of ordinary differential equation, general and particular solutions, initial and boundary conditions, linear and nonlinear differential equations, solution of first and second order differential equations and their applications, higher order differential equations, theory of operators and applications, introduction to partial differential equations.			
Textbook	Elementary Differential Equations, W.E. Boyce and R.C. Diprima: 9th edition, John Wiley & Sons, 2011.			
Objectives	Upon completion of this course, you should be able to: - Solve any first order differential equation. - Demonstrate variable separable, homogeneous, exact, linear differential equations. - Set up and solve physical motion problems, orthogonal trajectories Solve second order differential equations with constant coefficients and complementary and particular solutions. - Apply the methods of undetermined coefficients, variation of parameters Solve differential equations using power series, Froebenius series, Bessel functions, Gamma functions, Laplace transforms and the Heaviside (unit step) function. - Set up systems of linear differential equations using characteristic equations. - Apply Fourier series and Euler's Formula.			

Outline and Duration	**Topic**	**Duration (weeks)**
	1. Introduction to differential equations.	2
	2. First order differential equations.	2
	3. Second order linear differential equations.	2
	4. The Laplace Transform.	2
	5. Systems of two linear differential equations.	2
	6. Nonlinear differential equations and stability.	2
	7. Introduction to partial differential equations.	2
	Total	**14**

Class Schedule	Three lecture sessions per week, 50 minutes each.
Contribution to Professional Components	Math and Basic Sciences 95 % Engineering Topics 5%

Grade Distribution	Homework	Quizzes	Midterm exam	Lab	Team project	Final
	10%	10%	30%	-	-	50%

Course Relationship to Program Outcome	**Program outcome**	**ABET Outcomes**										
		a	b	c	d	e	f	g	h	i	j	k
	Key	x			x			x	x			x

Course Title	**Engineering Statistics and Probability**			
Course No.	**57002003-3**	Credit hours:3	Lectures:3	Lab: 0
Prerequisite	Introduction to Math II			
Course Description	The role of statistics in engineering, discrete random variables and probability distributions, descriptive statistics, statistical intervals, sampling distributions, testing hypothesis, goodness of fit and contingency tables, experimental design, regression analysis, computer applications.			
Textbook	1. Mathematical Statistics and Data Analysis. John A. Rice, 2nd Edition, Duxbury Press, 2010. 2. Probability and Statistics with reliability and queuing and computer science application, K.S. Trivedi, 2010.			
Objectives	By the completion of the course, students should be able to: - Use knowledge of statistic and probability in solving, designing and process control of engineering systems. - Communicate effectively using statistical and probability techniques and information.			

Outline and Duration	**Topic**	**Duration (weeks)**
	1. Graphs of frequency distributions.	0.5
	2. Descriptive measures and calculations.	0.5
	3. Basic Probability Concepts.	0.5
	4. Elementary theorems.	1
	5. Conditional probability.	0.5
	6. Random variables and chance variability.	0.5
	7. Probability density functions.	0.5
	8. Binomial and Hyper geometric distributions.	1
	9. Chebyshev's theorem.	0.5
	10. Poisson distribution. Multinomial distribution.	0.5
	11. Simulation concepts using cumulative density functions.	0.5
	12. Continuous Probability Distributions.	0.5
	13. Normal, uniform and distributions.	0.5
	14. Joint probability densities	0.5
	15. Sampling Distributions	1
	16. Inference Concerning Means	0.5
	17. Point and interval estimation	0.5
	18. error types and hypothesis testing	0.5
	19. Operating characteristic curves	0.5
	20. Simple Linear Regression	1
	21. Method of least square and Correlation	0.5
	Total	**14**

Class Schedule		Three lecture sessions per week, 50 minutes each.										
Contribution to Professional Components		Math and Basic Sciences 95 % Engineering Topics 5%										
Grade Distribution	Homework	Quizzes		Midterm exam			Lab		Team project		Final	
	15 %	15%		30%			-		-		40%	
Course Relationship to Program Outcome	**Program outcome**	**ABET Outcomes**										
		a	b	c	d	e	f	g	h	i	j	k
	Key	x	x	x					x		x	

Course Title	**Linear Algebra for Engineers**			
Course No.	**57001002-3**	Credit hours: 3	Lectures: 3	Lab: 0
Prerequisite	Introduction to Math (1)			
Course Description	Basic matrix algebra including matrices, inverses, linear systems, determinants, Eigen-values, Eigenvectors, vector spaces, solution of linear systems and Gaussian elimination, Fourier series, interpolation and curve fitting, linear transformations, applications, computer applications in linear algebra			
Textbook	Linear Algebra Demystified, David Mc mahon, McGraw-Hill, 2006.			
Objectives	By the completion of the course, the student should be able to: - Understand the basic notions of linear systems, vectors, matrix algebra, and vector spaces. - Gain computational skills.			

Outline and Duration	**Topic**	**Duration (weeks)**
	1. Systems of Linear Equations	2
	2. Matrix Algebra	2
	3. Determinants	2
	4. Vectors and Vector Spaces	2
	5. Linear Transformations	2
	6. The Eigenvalues Problem	2
	7. Special Matrices and Matrix Decomposition	2
	Total	**14**

Class Schedule	Three lecture sessions per week, 50 minutes each.
Contribution to Professional Components	Math and Basic Sciences 95 % Engineering Topics 5 %

Grade Distribution	Homework	Quizzes	Midterm exam	Lab	Team project	Final
	15 %	10%	25%	-	-	50%

Course Relationship to Program Outcome	**Program outcome**	**ABET Outcomes**										
		a	b	c	d	e	f	g	h	i	j	k
	Key	x			x	x	x					x

Course Title	**Introduction to Industrial Engineering**			
Course No.	**57021500-2**	Credit hours:2	Lectures:2	Lab: 0
Prerequisite	----			
Course Description	Introduction to engineering design, the design process, defining the client design problem, IE functions and requirements, generating and evaluating design alternatives, An introduction to an overview of the profession, including career planning, professionalism and communication, ethics, teamwork, industry site visits, industrial speakers, engineering design process and selected solution methods for problems in coordination and planning			
Textbook	W.C. Turner, J.H. Mize, K.E. Case and J.W. Nazemetz, Introduction to Industrial Engineering and Systems Engineering, 3rd Edition, Prentice Hall, Upper Saddle River, NJ, 1993.			
Objectives	Following this course a student should be able to: - Know the NSPE Code of ethics and apply the code of ethics to ethical dilemmas - Identify and industrial engineering problems - Apply industrial engineering problem-solving techniques to problems - Know the various areas in which industrial engineers work			

Outline and Duration	**Topic**	**Duration (weeks)**
	1. Introduction to Industrial Engineering Profession	1
	2. Overview of the UCF IEMS Department	1
	3. Professionalism and Ethics	2
	4. Technical Writing and Communication	2
	5. Productive Systems Design: Methods Engineering and Human Factors	2
	6. Productive Systems Design: Facility Planning and Design	2
	7. Productive Systems Control: Operations Planning and Control	2
	8. Productive Systems Control: Quality Control and Total Quality Management	1
	9. Systems Thinking	1
	Total	**14**

Class Schedule	Two lecture sessions per week, 50 minutes each
Contribution to Professional Components	Math & Basic Science 5% Engineering Topics 80% General Education 15%

Grade Distribution	Homework	Quizzes	Midterm exam	Lab	Team project	Final
	10%	10%	25%	-	15%	40%

Course Relationship to Program Outcome	**Program outcome**	**ABET Outcomes**										
		a	b	c	d	e	f	g	h	i	j	k
	Key	x				x	x	x	x			x

Course Title	**Work Systems Measurement and Analysis**			
Course No.	**57021501-3**	Credit hours: 3	Lectures:3	Lab: 0
Prerequisite	Engineering Statistics and Probability			
Course Description	Study of manufacturing and service methods and processes, analytical techniques of process flow and efficiency, Motion and Time Study (MTS), work methods and standards, time measurements, project **Measurement and Analysis of Systems Work Lab** The lab include: Outline Process Chart; Flow Process Chart; From-To or Cross-chart for Layout Simplification; Multiple Activity Chart; Flow Diagram and String Diagram; Operation Chart (Left-Right Hand Chart); Therbligs' application; Work sampling; Time Study; Learning Curve.			
Textbook	Kanawati, G, (Ed), 1992, Introduction to Work Study, 4th edition, International Labor Office:Geneva. (ISBN 92-2-107108-1).			
Objectives	By the completion of the course, the students should be able to: - Explain the basic concepts of 'work study' (WS): method study and work measurement. (Scope of WS; 'Productivity' meaning & 'Basic Procedure') - Explain/use the tools and techniques of 'method study' (Charts/diagrams, micro-motion studies & Principles of Motion economy) - Explain/use the tools and techniques of 'work measurement' (WM). (Basic concept of WM and various Techniques of WM) - Design, perform and analyse the studies/experiments related to WS, process analysis, operation analysis, time study, Pre-determined motion time system (PMTS), Standard data and work sampling with statistical analysis.			

	Topic	**Duration (weeks)**
Outline and Duration	1- Introduction to Work Study**:** Definition and scope of Work Study, Productivity and Work Study, Work Study, the Approach: Value of the Work Study, Techniques, and Basic Procedure	2
	2- Method Study**:** Method study and Job Selection; Recording Factors; Critical Examination ; String Diagram; Multiple Activity Chart ; Travel Chart; Principles of Motion Economy ; the Two Handed Chart; Operation Analysis and Fundamental Hand Motions; Micro-motion and Memo-motion analysis; Cycle-graph and Chrono-cyclograph	6
	3- Work Measurement**:** The Definition, Purpose, Use and Techniques; Work Sampling; **Time Study** :Equipment, Forms, Job-selection, Timing, Steps, Sample size, Rating),Basic time, Selected time, Allowances, Standard Time, Computer-Aided Time study(CAT); PTS: Wok Factor, MTM; Standard Data	6
	Total	**14**

Class Schedule	Three lecture sessions per week, 50 minutes.
Contribution to Professional Components	Math and Basic Sciences 5 % Engineering Topics 95 %

Grade Distribution	Homework	Quizzes	Midterm exam	Lab	Team project	Final
	15%	10%	25%	-	-	50%

Course Relationship to Program Outcome	**Program outcome**	**ABET Outcomes**										
		a	b	c	d	e	f	g	h	i	j	k
	Key	x	x	x		x	x			x		

Course Title	**Organizational and Human Resource Management**			
Course No.	**57021400-3**	Credit hours:3	Lectures:3	Lab: 0
Prerequisite	Engineering Statistics and Probability			
Course Description	This course provides a comprehensive analysis of individual and group behaviour in organizations. Its purpose is to provide an understanding of how organizations can be managed more effectively and at the same time enhance the quality of employees work life. Topics include motivation, rewarding behaviour, stress, individual and group behaviour, conflict, power and politics, leadership, job design, organizational structure, decision making, communication and organizational change and development. Organization, Design & Control. The changing role of human resource managers in a competitive environment is analysed and students are introduced to a variety of practical skills through role-plays, class discussions, and case work.			
Textbook	Organizational Behaviour, 15th edition, by Robbins & Judge, Prentice-Hall Publishing			
Objectives	Following this course a student should be able to: - Understand individual behaviour in organizations, including diversity, attitudes, job satisfaction, emotions, moods, personality, values, perception, decision making, and motivational theories. - Understand group behaviour in organizations, including communication, leadership, power and politics, conflict, and negotiations. - Understand the organizational system, including organizational structures, culture, human resources, and change.			

Outline and Duration	**Topic**	**Duration (weeks)**
	1. Organizational Behaviour	1
	2. Motivation Concepts	1
	3. Motivation: From Concepts to Applications	2
	4. Foundations of Group Behaviour	1
	5. Communication	1
	6. Leadership	1
	7. Power and Politics	1
	8. Conflict and Negotiation	1
	9. Foundations of Organization Structure	1
	10. Human Resource Policies and Practices	2
	11. Organizational Change and Stress Management	2
	Total	**14**

Class Schedule	Three lecture sessions per week, 50 minutes each.
Contribution to Professional Components	Engineering management 90% General Education 10%

Grade Distribution	Homework	Quizzes	Midterm exam	Lab	Team project	Final
	10%	10%	25%	-	15%	40%

Course Relationship to Program Outcome	**Program outcome**	**ABET Outcomes**										
		a	b	c	d	e	f	g	h	i	j	k
	Key				x	x	x	x				x

Course Title	**Circuit Analysis 1**			
Course No.	**57031401-3**	Credit hours:3	Lectures:2	Lab:3
Prerequisite	Introduction to Math (2)			
Course Description	This course covers basic circuit theory including the AC and DC characteristics of resistors, capacitors and inductors as used in elementary single and three-phase circuits. Characteristics of basic industrial electric motors and single and three-phase connections are studied. Basic factory automation is covered including sensors, relay control and programmable logic controllers. Laboratory exercises supplement the material discussed in class			
Textbook	Fundamentals of Electrical Engineering and Technology, 1st Edition, William D. Stanley, John R. Hackworth, and Richard L., Thomson Delmar Learning, 2007.			
Objectives	After successfully completing this course, students will able to demonstrate that they can do the following: - Given a simple rectangular or circular cylindrical solid with resistivity, compute the resistance from end to end. - Given a parallel plate structure and the dielectric properties of the insulating medium, calculate the capacitance of the structure. - Calculate the voltage induced in a closed circuit due to a time varying magnetic flux through the circuit. Both normal and oblique angles of incidence should be handled. - Calculate the force developed upon a linear current flowing in a uniform magnetic field. - Calculate the equivalent impedance of relatively simple series and parallel combinations of resistors, capacitors or inductors. Includes prediction of resonant frequency in series and parallel L-C circuits. - Describe the general torque-speed (slip) characteristics or an induction motor and solve for the running speed of an induction motor given a linear model of the t -s curve in rated operation range and particular load characteristics, e.g.,			

Outline and Duration	**Topic**	**Duration (weeks)**
	1. Basic DC circuits and general DC circuit analysis.	2
	2. Transient circuits	1
	3. AC circuits and steady-state AC circuit analysis.	1
	4. Diodes and their application.	1
	5. Transistors	1
	6. Operational amplifiers.	2
	7. Digital circuits: basic and advanced combinational forms	2
	8. Magnetic circuits.	1
	9. Three-phase circuits	1
	10. Transformers.	1
	11. DC and AC machines.	1
	Total	**14**

Class Schedule	Two lecture sessions per week, 50 minutes each plus three hours lab											
Contribution to Professional Components	Math and Basic Sciences 5 % Engineering Topics 95%											
Grade Distribution	Homework	Quizzes	Midterm exam	Lab	Team project	Final						
	10%	5%	25%	20%	-	40%						
Course Relationship to Program Outcome	**Program outcome**	**ABET Outcomes**										
		a	b	c	d	e	f	g	h	i	j	k
	Key	x	x	x				x	x			x

Course Title	**Fluids and Thermal Sciences**			
Course No.	**57022101-3**	Credit hours:3	Lectures:2	Lab:3
Prerequisite	Statics			
Course Description	The course covers fluid properties, flow classifications, fluid statics, conservation of mass equations, conservation of momentum equations, and conservation of energy equations. The course also covers properties of pure substances, P-V-T phase diagrams, property tables, first and second law of thermodynamics, one-dimensional steady-state conduction, free convection, and radiation heat transfer **Fluid and Thermal Science Lab** The lab includes experimental analysis of fluid flow, heat transfer, and thermodynamic systems.			
Textbook	1. Introduction to Thermodynamics and Heat Transfer by Yunus Cengel 2. Introduction to Fluid Mechanics (will be needed for Thermal fluids II) by Fox & McDonald			
Objectives	After successfully completing this course, students will able to demonstrate that they can do the following: - To learn the fundamentals of engineering Thermodynamics, heat transfer and fluid mechanics. - To learn techniques for formulating and solving thermal and fluid problems with emphasis on using an integrated and just-in-time teaching strategy. - To prepare students for Thermal-Fluids II and other advanced courses in thermal science. - To prepare students for competence in the workplace through cooperative group works and more computer-based teaching and learning.			

	Topic	**Duration**
Outline and Duration	1. Introduction to thermal sciences; relationship between thermodynamics, fluid mechanics and heat transfer. Introduction to transport properties: mass, momentum and energy	2
	2. Introduction to thermodynamic concepts: thermodynamic properties (temperature, pressure, etc.) & systems (open vs. closed) through examples. Properties of pure substances, equations of state, and T-v diagrams, tabulated data. Relationships for ideal gases	2
	3. Concepts of energy (First law) for a closed system. Work: work in ideal and real processes, various modes of work. First law for open system, control volume (CV) analysis. A more in-depth discussion of heat transfer and 'flow work' terms, Introduction to Second law of Thermodynamics and Entropy through heat transfer in a reversible process.	3

	4. Heat transfer modes: conduction (Fourier's law), convection (Newton's law) & radiation.	4
	5. Fundamental Concepts of fluid mechanics, Basic equations in integral form, External flows (cont.), Empirical method, flow over flat plate, cylinder in cross-flow, banks of tubes	3
	Total	**14**

Class Schedule	Two-lecture sessions per week, 50 minutes each plus three hours lab
Contribution to Professional Components	Math and Basic Sciences 33% Engineering Topics 67%

Grade Distribution	Homework	Quizzes	Midterm exam	Lab	Team project	Final
	10%	5%	25%	20%	--	40%

Course Relationship to Program Outcome	**Program outcome**	**ABET Outcomes**										
		a	b	c	d	e	f	g	h	i	j	k
	Key	x	x			e		x				

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Course Title	**Dynamics and Vibrations**			
Course No.	**57022102-3**	Credit hours: 3	Lectures:3	Lab: 0
Prerequisite	Statics			
Course Description	The course covers planar kinematics of rigid bodies, relative motion analysis of velocity and acceleration, planar kinetics of rigid bodies: force and acceleration, work and energy methods. The course also includes an introduction to free vibrations: harmonic motion, viscous damping, response to harmonic excitation of un-damped and damped systems, and an introduction to forced vibrations.			
Textbook	Dynamics and Vibration: An Introduction by Magd Abdel Wahab.			
Objectives	Students will develop ability to model and analyse of the motion of rigid bodies subjected to external forces and moments.			

Outline and Duration	**Topic**	**Duration (weeks)**
	1. Mass-Spring-Damper :undammed free vibrations, under- critically- and over-damped free vibrations, amplification factor and phase angle for forced vibrations, resonance	3
	2. Review of Kinematics: basic kinematic equation, coordinate systems	1
	3. Numerical Integration: Euler , Runge-Kutta, MATLAB ode toolbox	1
	4. Review of Particle Dynamics: free body diagrams; kinematics; Newton's laws; equations of motion, integrals of motion; conservation of linear and angular momentum, conservation of total mechanical energy, principles of linear/angular impulse and momentum, principles of work and kinetic energy, orbital mechanics	3
	5. Systems of Particles: Newton's and Euler's laws	2
	6. Rigid Body Dynamics: degrees of freedom, moments and products of inertia, inertia matrix and coordinate transformations, principal axes and principal moments of inertia, Euler's theorem,	1
	7. Euler Angles: sequences, angular velocities in terms of Euler angles, free motion of an axisymmetric rigid body, body and space cone	2
	8. Aerospace Applications	1
	Total	**14**

Class Schedule	Three lecture sessions per week, 50 minutes each.
Contribution to Professional Components	Math and Basic Sciences 25 % Engineering Topics 75 %

Grade Distribution	Homework	Quizzes	Midterm exam	Lab	Team project	Final
	10%	10%	25%	-	15%	40%

Course Relationship to Program Outcome	**Program outcome**	**ABET Outcomes**										
		a	b	c	d	e	f	g	h	i	j	k
	Key	x			x			x				x

Course Title	**Engineering Materials**			
Course No.	**57022300-3**	Credit hours: 3	Lectures:2	Lab: 3
Prerequisite	General chemistry			
Course Description	The course covers atomic structure and bonding, structure of materials (metal, polymer, ceramics, and composites), elastic and plastic deformation, solution hardening, dispersion hardening, introduction to phase diagrams, ferrous and nonferrous metals (steel, cast iron, aluminium and copper), and an introduction to advanced materials **Engineering Materials Lab.** The lab includes: experiments on tensile, hardness, fatigue, impact, and creep tests, macro and micro-examination of materials, effect of cold working and heat treatment on metals, hardening and tempering of steel, Carburizing of low carbon steel.			
Textbook	Fundamentals of Materials Science and Engineering, An Integrated Approach, by: William D. Callister & David G. Rethwisch, 3rd Edition, John Wiley, 2008.			
Objectives	By the completion of the course, the students should be able to: - Understand the concepts of atomic bonding, crystal structures, imperfections, diffusion, mechanical properties, electron energy, and dislocations as related to processing and performance of engineering materials. - Understand the relationship between structure, processing and properties for selection of existing materials and development of new materials in the design of parts, structures, and devices. - Understand the microstructure characteristics, electronic properties, materials formation, and manipulation of microstructure for application in engineering design and materials processing. - Understand the relations between the composition, temperature and phase fractions applied to equilibrium phase diagrams for given material systems.			

Outline and Duration	**Topic**	**Duration (weeks)**
	1. Demonstrate an ability to analyse crystalline structures, and calculate Miller Indices, packing factor and density of selected unit cells, non-crystalline behaviour, and anisotropy	2
	2. Show the application of materials microstructure in the design of materials and their processing to obtain required properties	3
	3. Demonstrate the effect of materials microstructure at the atomic scale on the engineering properties of materials (Course Objectives 2, 3).	3
	4. Demonstrate an ability to analyse strengthening by strain hardening, solid solution and grain size reduction, and use of Hall Petch relation,	3
	5. Develop an experiment to characterize materials properties for an engineering application	3
	Total	**14**

Class schedule	Two-lecture sessions per week, 50 minutes each plus three hours lab											
Contribution to Professional Components	Math and Basic Sciences 30 % Engineering Topics 70%											
Grade Distribution	Homework	Quizzes	Midterm exam		Lab	Team project	Final					
	10%	10%	20%		20%	-	40%					
Course Relationship to Program Outcome	**Program outcome**	**ABET Outcomes**										
		a	b	c	d	e	f	g	h	i	j	k
	Key	x	x	x				x				x

Course Title	**Computer Application in Industrial Engineering**			
Course No.	**57022200-3**	Credit hours:3	Lectures:2	Lab: 3
Prerequisite	Linear Algebra for Engineers			
Course Description	Computer structured programming using language C, structured and user-defined data types, simple and complex structures declaration, condition and repetition structures, functions and procedures, basic libraries, dynamic memory allocation, introduction to object-oriented and visual programming. Basic applications and samples for Industrial Engineering.			
Textbook	Kernighan, Brian, and Dennis Ritchie. The C Programming Language. 2nd ed. Upper Saddle River, NJ: Prentice Hall, 1988.			
Objectives	The student, upon completion of this course, will be able to: - Write algorithms with pseudocode to conceptualize a program during the program-design - Develop structured C programs using repetition structures, functions and procedures, structured and user-defined data types. - Develop simple Console or Visual applications that interactwith relational databases. - Write simple codes within basic Visual C++ (or C) in the form of methods, sub procedures and functions, forms; parameterable data cells and buttons, and explain the concept of Object-Oriented Design (OOD).			

Outline and Duration	**Topic**	**Duration (weeks)**
	1. Introduction. Writing, compiling, and debugging C programs. Hello world, Variables and datatypes, operators, C standard library: stdio.h, stdlib.h	2
	2. Control flow. Functions and modular programming. Variable scope. Static and global variables, more control flow. Input and output.	1
	3. Conditional and iterative structures (loops)	2
	4. Pointers and memory addressing, pointers to pointers, pointer and string arrays, multidimensional arrays. Stacks and queues.	3
	5. Dynamic memory allocation, malloc, realloc, and free functions	1
	6. FILE type and storing data	2
	7. Introduction to visual C++ form programming	3
	Total	**14**

Class Schedule	2-lecture sessions 50 minutes each, 3h lab sessions per week
Contribution to Professional Components	Engineering science 90% Engineering management 10%

Grade Distribution	Homework	Quizzes	Midterm exam	Lab	Team project	Final
	10%	10%	20%	10%	10%	40%

Course Relationship to Program Outcome	**Program outcome**	**ABET Outcomes**										
		a	b	c	d	e	f	g	h	i	j	k
	Key				x	x	x	x				x

Kingdom of Saudi Arabia
Ministry of Higher Education
Umm Al-Qura University

College of Engineering at Al-Qunfdh
Industrial Engineering Department

Course Title	**Operations Research (1)**			
Course No.	**57022006-3**	Credit hours: 3	Lectures:3	Lab: 0
Prerequisite	Engineering Statistics and Probability			
Course Description	Mathematical modelling and operations research, linear programming, simplex algorithm, duality, transportation and assignment problems, network models			
Textbook	Introduction to Operations Research, Hillier and Lieberman (7th edition) McGraw Hill, Singapore, 2001, ISBN 0-07-232169-5			
Objectives	At the end of the course the students will be able to: - Understand the integrated nature of the discipline. - Understand the basic principles of linear programming. - Comprehend the concepts of Simplex algorithm. - Analyse the concept of duality and post optimality analysis. - Learn the Assignment model used for solving a linear program. - Learn the Transportation problem for solving a linear program. - Identify, formulate, and solve basic engineering and managerial problems.			

Outline and Duration

Topic	Duration (weeks)
1. Introduction to operations research	2
2. Introduction to linear programming	2
3. The simplex method	2
4. Sensitivity analysis	1
5. Duality	1
6. Transportation, assignment, and transhipment problems	3
7. Network models	2
8. Examples on integer programming	1
Total	**14**

Class Schedule	Three lecture sessions per week, 50 minutes each.
Contribution to Professional Components	Math and Basic Sciences: 30% Engineering Topics: 70%

Grade Distribution	Homework	Quizzes	Midterm exam	Lab	Team project	Final
	10%	10%	25%	-	15%	40%

Course Relationship to Program Outcome	**Program outcome**	**ABET Outcomes**										
		a	b	c	d	e	f	g	h	i	j	k
	Key	x	x	x		x			x			x

Course Title	**Engineering Reports**			
Course No.	**57012106-1**	Credit hours:1	Lectures:1	Lab: 0
Prerequisite	Technical English Language			
Course Description	Research methodology concepts and definition, research ethics, problem identification, research plan preparation, data gathering and collection, data presentation and analysis, design of research report, principles and procedures of engineering reports writing; organizing information, and writing specialized forms such as abstracts, instructions, and proposals, formal Email writing.			
Textbook	A Guide to Writing as an Engineer, David and David A. Mc Murrey John Wiley, 3rd ed. 2010.			
Objectives	Following this course a student should be able to: - Explain and apply techniques for scientific writing and research methodology to prepare the writing of a scientific report. - Perform investigation using methods, explain and take position on the results as well as summarize related work - Apply the knowledge in scientific writing and research methodology and use the knowledge to write a scientific report.			

Outline and Duration

Topic	Duration (weeks)
1. Introduction	1
2. Eliminating Sporadic Noise in Engineering Writing	1
3. Guidelines for Writing Noise-Free Engineering Documents	2
4. Letters, Memoranda, Email, and Other Media for Engineers	2
5. Writing Common Engineering Documents	1
6. Writing an Engineering Report	1
7. Constructing Engineering Tables and Graphics	2
8. Accessing Engineering Information	1
9. Engineering Your Speaking	2
10. Writing to Get an Engineering Job	1
Total	**14**

Class Schedule	One lecture sessions per week, 50 minutes.
Contribution to Professional Components	Math and Basic Sciences 0 % General Education 100%

Grade Distribution	Homework	Quizzes	Midterm exam	Lab	Team project	Final
	10%	10%	25%	-	15%	40%

Course Relationship to Program Outcome	**Program outcome**	**ABET Outcomes**										
		a	b	c	d	e	f	g	h	i	j	k
	Key	x			x	x		x	x			x

Course Title	**Engineering Computational Methods**			
Course No.	**57003004-3**	Credit hours:3	Lectures:2	Lab:3
Prerequisite	Differential Equations for Engineers			
Course Description	Introduction to Numerical Methods, Roots of non-linear equations, linear systems of equations: matrix methods, Gaussian elimination, Gauss-Seidel, ill–conditioning, Errors: Sources, estimates, propagation, floating point arithmetic, curve fitting and interpolation,, numerical solution of differential equations, finite difference, Euler and Runge-Kuta methods. Lab sessions.			
Textbook	Applied Numerical Methods with Matlab for Engineers for Engineers and Scientists. Chapra, S.C. (2012), 3rd ed., McGraw-Hill; New York.			
Objectives	By the completion of the course, students should be able to: - Explain the difference between an analytical solution and a numerical solution. - Identify and apply the best numerical method for a wide range of engineering problems. - Calculate and analyse the error associated with the use of numerical solutions. - Solve basic engineering problems using numerical methods and Matlab.			

Outline and Duration	**Topic**	**Duration (weeks)**
	1. Introduction to numerical methods	2
	2. Interpolation and extrapolation	2
	3. Numerical integration	2
	4. Numerical Solution of non-linear equations;	1
	5. Direct solution of the system of linear equations;	2
	6. Numerical solution of initial value problems;	2
	7. Numerical solution of linear and nonlinear boundary value problems	2
	8. Numerical solution of partial differential equations	1
	Total	**14**

Class Schedule	Two lecture sessions per week, 50 minutes each plus three hours lab
Contribution to Professional Components	Math and Basic Sciences 70 % Engineering Topics 30%

Grade Distribution	Homework	Quizzes	Midterm exam	Lab	Team project	Final
	10%	10%	20%	20%	-	40%

Course Relationship to Program Outcome	**Program outcome**	**ABET Outcomes**										
		a	b	c	d	e	f	g	h	i	j	k
	Key	x			x			x				x

Course Title	**Engineering Measurements**			
Course No.	**57022301-3**	Credit hours:3	Lectures:2	Lab:3
Prerequisite	Circuit Analysis 1			
Course Description	Errors, linear, angular and contour measurements. Fits and tolerances: inter changeability, ISO shaft and hole systems of fits and tolerances. Thread metrology, Gear metrology; surface texture, out of roundness and flatness measurements. Basic electrical measurements and sensing devices DC, AC bridge, and measuring systems, transducers, smart sensors and transmitters. Force, torque and strain measurements, design of load cells **Metrology & Engineering Measurements Lab** The lab include measurement of: alignment, angular measurements, diameters, surface roughness, out of roundness, screws, gears, thermocouples, force, torque and strain			
Textbook	Raghavendra N.A. and Krishnamurthy, Engineering Metrology and Measurement, Oxford University Press,2013, ISBN-13: 9780198085492			
Objectives	After successfully completing this course, students will able to: - Understand Metrology principles of linear and angular measurement - Understand the principles and operation of precision measurement tools and equipment used in modern manufacturing - Understand the fundamentals of error analysis and uncertainty - Measuring instrumentation selection according to defect criterion expected - Learn how to analyze data and make engineering conclusion - Understand the fundamentals of inspection methods and systems - Understand the fundamentals of modem quality concepts - Study the various electrical and mechanical instrumentation devices			

	Topic	**Duration (weeks)**
Outline and Duration	1. Concept of Measurement: General concept – Generalised measurement system-Units and standards, measuring instruments, sensitivity, readability, range of accuracy, precision, static and dynamic response, repeatability, systematic and random errors, correction and calibration	4
	2. Linear And Angular Measurement: Definition of metrology-Linear measuring instruments: Varnier, micrometre, interval measurement, Slip gauges and classification, interferometry, optical flats, limit gauges- Comparators: Mechanical, pneumatic and electrical types, applications. Angular measurements:-Sine bar, optical bevel protractor, angle Decker – Taper measurements, coordinate measuring machine (CMM).	3

	3. Form Measurement: Measurement of screw threads-Thread gauges, floating carriage micrometre-measurement of gears-tooth thickness-constant chord and base tangent method-Gleason gear testing machine – radius measurements-surface finish, straightness, flatness and roundness	3
	4. Laser and Advances in Metrology: Precision instruments based on laser-Principles- laser interferometer-application in linear, angular measurements and machine tool metrology. Coordinate measuring machine (CMM)- Constructional features – types, applications – digital devices computer aided inspection	2
	5. Measurement of Power and Flow: Force, torque and power: mechanical, pneumatic, hydraulic and electrical types. Flow measurement: Venturi, orifice, rotameter, Pitot tube. Temperature: bimetallic strip, pressure thermometers, thermocouples, electrical resistance thermistor	2
	Total	**14**

Class Schedule	Two lecture sessions per week, 50 minutes each plus three hours lab
Contribution to Professional Components	Math and Basic Sciences 30% Engineering Topics 70%

Grade Distribution	Homework	Quizzes	Midterm exam	Lab	Team project	Final
	10%	5%	25%	20%	--	40%

Course Relationship to Program Outcome	**Program outcome**	**ABET Outcomes**										
		a	b	c	d	e	f	g	h	i	j	k
	Key	x	x				x	x				x

Course Title	**Human Factors Engineering**			
Course No.	**57022502-3**	Credit hours: 3	Lectures:2	Lab: 3
Prerequisite	Work Systems Measurement & Analysis			
Course Description	Introduction to human factors engineering. Muscular work. Nervous control. Work efficiency. Body size and anthropometrics. Work station design. Heavy work. Handling loads. Man-machine systems. Mental activity. Fatigue. Stress and boredom. Vision and lighting. Noise and vibration. **Human Factors Engineering Lab** The lab include: anthropometric measurements, application of anthropometric data in workstation design, vision testing, strength measurements, audiometry, reaction time, physical work capacity through heart rate and oxygen consumption, & manual material handling.			
Textbook	Bush, P. M. (2012). Ergonomics Foundational Principles, Applications, and Technologies. Taylor and Francis (CRC Press), US. **Reference Materials:** 1. Kromer, K.H. (2008).Fitting the human: Introduction to Ergonomics. 6th ed. Taylor and Francis (CRC Press), US. 2. Wickens, K.H., Yili Liu, J. D. and Becker, S. E. (2004).An Introduction to Human Factors Engineering. 2nd ed. Pearson Educational, Inc, US.			
Objectives	At the end of the course the students will be able to: - Explain the Basic Concepts of human factors engineering. - Identify, formulate, and solve human factors problems and implement them. - Explain basic principles and impact of environmental factors such as illumination, noise, and vibration. - Develop verbal and written communication skills through written reports and presentations. - Explain and use ergonomic tools/ techniques to conduct experimental and analytical studies. - Work in a Team and communicate effectively.			
	Topic			**Duration (weeks)**
Outline and Duration	1. Introduction to human factors engineering, Muscular Work: physiological principles, Static effort, Nervous Control of Movements, Work Efficiency, Body size and Anthropometrics			3
	2. Workstation Design: Working height, Neck & head, Room to Grasp, sitting at work, Computer work station and Design of the keyboard			2
	3. Heavy Work: Physiological principles, Energy consumption, Upper limits, Energy efficiency, Heart rate as a measure of workload; Work and Heat, Case histories			2

	4. Handling loads: Back troubles, ID Pressure, Biomechanical models of Lower Back, IO Pressure, Subjective judgment	1
	5. Human-machine Systems: Introduction, Displays, Controls, C/D relationship	1
	6. Mental Activity: Elements of Brain work, Uptake of information, Memory, Sustained alertness (vigilance)	2
	7. Fatigue: Muscular, General, Fatigue in industry and measurement of Fatigue, Introduction to Occupational Stress, Boredom, Vision & Lighting, and Noise and Vibration.	3
	Total	**14**

Class Schedule	Two lecture sessions per week, 50 minutes each plus three hours lab
Contribution to Professional Components	Engineering Topics: 85% General Science: 15%

Grade Distributio	Homework	Quizzes	Midterm exam	Lab	Team project	Final
	10%	5%	25%	20%	--	40%

Course Relationship to Program	**Program outcome**	**ABET Outcomes**										
		a	B	c	d	e	f	g	h	i	j	k
	Key	x	X	x		x		x			x	

Course Title	**Manufacturing Processes (1)**			
Course No.	**57023302-3**	Credit hours:3	Lectures:2	Lab:3
Prerequisite	Engineering materials			
Course Description	Metal forming: Mechanical behaviour and forming of metals, different types of mechanical behaviour and main factors affecting it. Yield criteria, representative stress and representative strain, work due to plastic deformation, classification of forming processes with respect to strain rate and temperature. Temperature rise in dynamic forming. Bulk deformation processes: forging, extrusion, rolling, rod and wire drawing. Sheet forming processes: blanking, deep drawing and bending. **Manufacturing Technology Lab** The lab include metal forming methods and mechanical tests			
Textbook	Groover, M.P. (2007). Fundamentals of Modern Manufacturing 3rd edition. New York NY: John Wiley & Sons.			
Objectives	After successfully completing this course, students will able to demonstrate that they can do the following: - State basic properties of materials and apply these properties to manufacturing process and product design. - Compare and contrast the design and production advantages of traditional - Mechanical manufacturing processes (casting, forming, machining, and joining). - Evaluate material-process-geometry relationships in manufacturing processes. - Differentiate advanced mechanical manufacturing processes e.g. micro-scale and nano-scale technologies.			

Outline and Duration

Topic	Duration (weeks)
1.Metals:	2
2. Heat Treatment	1
3. Machining	1
4. Casting	2
5. Forming	1
6. Powder Metallurgy	1
7. Joining	2
8. Polymers & Polymer Processing	1
9. Ceramics & Glass working	1
10. Micro fabrication Technologies	1
11. Nanofabrication Technologies	1
Total	**14**

Class Schedule	Two-lecture sessions per week, 50 minutes each plus three hours lab

Contribution to Professional Components		Math and Basic Sciences 0 % Engineering Topics 100 %									
Grade Distribution	Homework	Quizzes	Midterm exam		Lab	Team project		Final			
	10%	5%	25%		20%	-		40%			
Course Relationship to Program Outcome	**Program outcome**	**ABET Outcomes**									
		a	b	c	d	e	f	g	h	i	j	k
	Key		x	x	x			x	x		x	x

	Production Planning and Inventory Control			
Course No.	**57022504-3**	Credit hours: 3	Lectures:3	Lab: 0
Prerequisite	Organizational and Human Resource Management			
Course Description	Basic concepts of Production and Operations Management (POM), design of products and services, processes and technologies, E-commerce and operations management, inventory management, supply-Chain management, just-in-time and lean production, forecasting, Material Requirements Planning (MRP), introduction to Enterprise Requirement Planning (ERP), capacity and aggregate planning, Scheduling.			
Textbook	Heizer J., and Render B., Principles of Operations Management, Eighth Edition, Prentice Hall; 8 edition , 2010			
Objectives	After successfully completing this course, students will able to demonstrate that they can do the following: - Understating how to manage the production function. - Understand some standard tools techniques used by production or operation mangers. - Design of products and services, techniques from improving design process. - Develop an appreciation for interaction of this management activity with other management systems within the organization. - Use computer software to solve production managerial problems. - Determine the optimal capacity and product availability. - Solve real case studies. - Work in group to solve homework and projects			

Outline and Duration	**Topic**	**Duration (weeks)**
	1- Introduction to Production Planning and Control	1
	2- Demand Forecasting	3
	3- Aggregate Production Planning	2
	4- Inventory Management System	2
	5- Material Requirement Planning (MRP)	1
	6- Operation Scheduling	2
	7- Supply Chain Management	1
	8- Measuring Manufacturing Systems Complexity	2
	Total	**14**

Class Schedule	Three lecture sessions per week, 50 minutes.	
Contribution to Professional Components	Engineering systems Engineering design	80 % 20%

Grade Distribution	Homework	Quizzes	Midterm exam	Lab	Team project	Final
	15%	10%	25%	-	-	50%

Course Title	**Manufacturing Processes (2)**			
Course No.	**57023302-3**	Credit hours:3	Lectures:2	Lab:3
Prerequisite	Manufacturing Processes (1)			
Course Description	Machining processes: conventional machining processes, single-point cutting, multiple-point cutting, tool geometry, chip formation, chip types. Cutting dynamics: cutting forces, shear angle vs. shear stress, cutting tool materials, tool life. Non-traditional machining processes: mechanical energy processes - electrochemical machining processes - thermal energy processes - chemical machining – Lazer – compressive fluids- compressive air with abrasive materials **Manufacturing processes (2) Lab** Laboratory experiments dealing with basic material processing operations. Fits and tolerances			
Textbook	Groover, M.P. (2007). Fundamentals of Modern Manufacturing 3rd edition. New York NY: John Wiley & Sons.			
Objectives	After successfully completing this course, students will able to demonstrate that they can do the following: - Calculate and understand appropriate single-point machining relationships taking tool material and machine constraints into consideration. - Understand the principles and appropriateness of non-traditional machining processes - Select a suitable manufacturing process in order to achieve the specified product performance and design criterion while considering cost. - Understand basics of NC/CNC operations			

Outline and Duration

Topic	Duration (weeks)
8. Theory of Metal Cutting	1
9. Machining Operations	3
10. Cutting Tool Technology	2
11. Economics of Metal Cutting Operations	2
12. Non-traditional Machining Processes	3
13. Computer Numerical Control	2
14. Industrial Robotics	1
Total	**14**

Class Schedule	Two-lecture sessions per week, 50 minutes each plus three hours lab

Contribution to Professional Components	Manufacturing engineering 85 % Engineering science 15 %										
Grade Distribution	Homework	Quizzes	Midterm exam		Lab	Team project	Final				
	10%	5%	25%		20%	-	40%				
Course Relationship to Program Outcome	**Program outcome**	**ABET Outcomes**									
		a	b	c	d	e	f	g	h	i	j	k
	Key		x	x	x			x	x		x	x

Course Title	**Operations Research(2)**			
Course No.	**57023007-3**	Credit hours:3	Lectures:3	Lab: 0
Prerequisite	Operations Research(1)			
Course Description	Probabilistic and stochastic models used in industrial engineering systems: Markov processes, stochastic processes, queuing and their applications. Discrete and continuous processes			
Textbook	Quantitative Analysis for Management, Barry Render, Ralph M. Stair (Jr) and Michael Henna, Prentice Hall International Inc., 9th Edition (2006)			
Objectives	After successfully completing this course, students will able to demonstrate that they can do the following: - Develop the knowledge of analytical techniques of OR-II - Understand the basic principles and techniques of OR-II - Comprehend the Nonlinear programming and its applications - Waiting line models and queuing theory - Comprehend the dynamic programming and its applications - Understand and apply Inventory models - Understand and apply Markov analysis - Understand Game Theory and its applications - Analyse & solve a real life problem for Term project with a team - Realize the computer software applications and solve OR-II problems			

Outline and Duration	**Topic**	**Duration (weeks)**
	1. Non-linear Programming; graphical illustration, concave and convex functions, unconstraint optimization; one & multi variables, one dimensional search alg., gradient search method, Khun Tucker conditions, Frank Wolfe alg.	3
	2. Waiting Lines and Queuing Theory Models: characteristics of models. single, multi-channel models, constant service time model, finite population model.	2
	3. Dynamic Programming; shortest route problem by DP, terminology, notations, knapsack problem, air transportation service problem, resource allocation problems, distribution of effort problem.	3
	4. Inventory models, elements of inventory control, inventory control systems, economic order quantity models, quantity discounts, reorder point, order quantity for a periodic inventory system.	2
	5. Markov Analysis: introduction, states & state probabilities, transition matrix, predicting future market share, equilibrium conditions, absorbing states & the fundamental matrix	2
	6. Game theory: language of games, the minimax criterion, pure strategy games, mixed strategy games, dominance.	2
	Total	**14**

Class Schedule	Three-lecture sessions per week, 50 minutes each.

Contribution to Professional Components		Math and Basic Science 30% Engineering Topics 70%										
Grade Distribution	Homework	Quizzes		Midterm exam		Lab		Team project			Final	
	10%	10%		25%		-		15%			40%	
Course Relationship to Program Outcome	**Program outcome**	**ABET Outcomes**										
		a	b	c	d	e	f	g	h	i	j	k
	Key	x		x	x			x	x			x

Course Title	**Industrial Information Systems**			
Course No.	**57023503-3**	Credit hours:3	Lectures:3	Lab: 0
Prerequisite	**Computer Applications in Industrial Systems**			
	General concepts. Values and attributes of information. Different types of information systems. Concepts of managerial information systems. Analysis, design and development of industrial information systems. Developing information systems by using microcomputers.			
Textbook	Management Information Systems(14th Edition) Managing the Digital Firm, by Kenneth C. Laudon, Jane P. Laudon, Published 2015 by Prentice Hall ISBN-13: 978-0-13-407888-5, ISBN: 0-13-407888-8			
Objectives	Upon completion of this course, the student should be able to: - Explain the importance of Information Systems for business & management - Identify ethical implications of Information Systems - Describe how enterprise applications promote business process integration - Identify how to improve organizational performance with Information Systems - Explain the Strategic Role of Information Systems in Organizations - Analyse how internet technology has changed value propositions and business models - Identify the challenges posed by enterprise applications and management solutions - Describe how building new systems produce organizational change - Demonstrate harmony by communicating effectively in multi-disciplinary teams			

Outline and Duration

Topic	Duration (weeks)
1. Introduction to Information Systems	1
2. Information Systems for Competitive Advantage	1
3. Using Information Technology to Engage in Electronic Commerce	2
4. System Users and Developers	2
5. Systems Development.	2
6. Information in Action	1
7. Information Security	1
8. Ethical Implications of Information Technology	2
9. Decision Support Systems	2
Total	**14**

Class Schedule	Three lecture sessions per week, 50 minutes each.
Contribution to Professional Components	Math and Basic Sciences 75 % Engineering Topics 25%

Grade Distribution	Homework	Quizzes	Midterm exam	Lab	Team project	Final
	10%	10%	30%	-	-	50%

Course Relationship to Program Outcome	**Program outcome**	**ABET Outcomes**										
		a	b	c	d	e	f	g	h	i	j	k
	Key		x			x		x		x	x	

Course Title	**Engineering Economy**			
Course No.	**57011104-2**	Credit hours: 2	Lectures:2	Lab: 0
Prerequisite	----			
Course Description	The course covers cost concepts, time value of money, interest formulas, cash flow and equivalence calculations, inflation and taxation, measures of investment worth, projects evaluation, depreciation, break-even analysis, and replacement analyses.			
Textbook	1. Engineering Economy, Leland Blank, P.E., and Anthony Tarquin, P.E., 6th Ed., 2005, McGraw-Hill ISBN 0-07-111558-7			

Outline and Duration	**Topic**	**Duration (weeks)**
	1. Foundation of Engineering Economy: Interest (simple & compound), cash flows, MARR, rate of return (ROR) & CFD	1
	2. Factors: How time and interest affect money, combining Factors: Single payment, Uniform Series, Arithmetic & Geometric Gradient, shifting of series, determination of unknown i & n, Interpolation	1
	3. Nominal And effective Interest Rates: Nominal and effective interest and equivalence relations involving Payment period and Compounding period	1
	4. Tools for the evaluation of alternatives: PW, FW, AW, CC, PbP, ROR, B/C Analysis	1
	5. Making Decisions on real world. Replacement study & its applications, Break Even Analysis	1
	6. Effects of Inflation, Evaluation of alternatives adjusted for inflation	1
	7. Depreciation Methods: SL, SYD, DB, DDB	1
	8. Role of cost management	1
	9. Lead and lag measures, Constrained resources and Cost measurement	1
	10. Activity-based costing, Job costing, Process costing	1
	11. Joint processes and Service costs	1
	12. Activity-based management, Managing quality and time	1
	13. Cost estimation	1
	14. Financial Modelling and decision-making	1
	Total	**14**

Class schedule	Three lecture sessions per week, 50 minutes each.
Contribution to Professional Components	Engineering Topics 70 % General Education 30 %

Grade Distribution	Homework	Quizzes	Midterm exam	Lab	Team project	Final
	10%	10%	25%	-	15%	40%

Course Relationship to Program Outcome	**Program outcome**	**ABET Outcomes**										
		a	b	c	d	e	f	g	h	i	j	k
	Key	x			x	x	x	x	x			x

Course Title	**Engineering Ethics**			
Course No.	**57014101-2**	Credit hours:2	Lectures:2	Lab: 0
Prerequisite	----			
Course Description	Introduction, laws, regulations and codes governing professional practice, responsibilities and liabilities, environmental legislation, social impacts of engineering services, relations between engineer, client and general public with regards to moral issues and ethics in Islam. Contemporary applications.			
Textbook	Introduction to Engineering Ethics, Mike Martin, Roland Schinzinger, 3rd edition, 2010			
Objectives	By the completion of the course, the students should be able to: - Understand the system of moral principles confronting in engineering practices - Introduce the ethical and professional responsibilities of engineers - Build professional reputation strongly based on the principles of truthfulness and professional excellence			

Outline and Duration

Ethics and Professionalism **Topic**	**Duration**
1. Ethics and Professionalism	1
2. Moral Reasoning and Codes of Ethics	1
3. Moral Frameworks	1
4. Engineering as Social Experimentation	1
5. Commitment to Safety	2
6. Workplace Responsibilities and Rights	1
7. Truth and Truthfulness	1
8. Computer Ethics	1
9. Environmental Ethics	2
10. Global Justice	1
11. Ethics in Islam	2
Total	**14**

Class Schedule	Two lecture sessions per week, 50 minutes each
Contribution to Professional Components	Math and Basic Sciences 0 % Engineering Topics 100%

Grade Distribution

Homework	Quizzes	Midterm exam	Lab	Team project	Final
10%	10%	25%	-	15%	40%

Course Relationship to Program Outcome

Program outcome	**ABET Outcomes**										
	a	b	c	d	e	f	g	h	i	j	k
Key				x	x	x	x	x			

Course Title	**Computer Aided Design and Manufacturing (CAD/CAM)**			
Course No.	**57023201-3**	Credit hours:3	Lectures:2	Lab:3
Prerequisite	Manufacturing Processes (2)			
Course Description	Fundamentals of computer aided engineering and design. CAD applications. Geometric modelling. Engineering analysis and finite element technique. Fundamentals of computer aided manufacturing. CNC concepts and part programming. CAD / CAM integration. **CAD&CAM Lab**. The lab covers 3D modelling utilizing different CAD software packages, Drawing of key mechanical elements, Mechanical assembly, Projected and sectional views, Drawing documentation, and Practical implementations of learned CAD techniques in team project, CAD / CAM integration, CNC			
Textbook	Valentino J., and Goldenberg J., Introduction to Computer Numerical Control, 3rd Ed, Prentice Hall, 2003			
Objectives	At the end of the course the students will be able to: - Understand basic concepts of Computer Numerical Control (CNC) machines - Develop/compute the process plan of simple components from drawing, write the part program in Machine Language and execute it on a model CNC machine Also, write part program in APT for simple 2-D components - Explain/use the working principles of different types of Robots and be able to write programs in VAL II. Also, explain the philosophy and methods of Group Technology (GT) - Explain the basic principles of CAPP and how CIMS work. Also, explain the philosophy and working principles of Flexible Manufacturing System (FMS)			

	Topic	**Duration (weeks)**
Outline and Duration	1. Introduction: Introduction to CNC manufacturing, modern machine tool control, safety instruction	1
	2. Drilling and Milling Operations: Introduction, Tooling for drilling and milling operations, features of CNC machining centres, word address programming	2
	3. Hole Operations: Programming hole operations	1
	4. Profile Programming: Programming linear profile, programming circular profile cutter diameter compensation	1
	5. Sub programming: Programming with subprograms	1
	6. Lathe Operation: Introduction to CNC lathe operation, CNC lathe	1
	7. Computer Aided Part Programming: Whatare CAPP, using APT programming	1
	8. Robot Technology: Physical configurations, basic motions, work cell control, robot programming methods, VAL II programming,	2

	9. Group Technology: Part families, classification and coding systems, group technology and machine cells	1
	10. Computer Integrated Manufacturing: Benefits of CIM, machine tools and related	1
	Total	**14**

Class Schedule	Two-lecture sessions per week, 50 minutes each plus three hours lab
Contribution to Professional Components	Math and Basic Sciences 0 % Engineering Topics 100%

Grade Distribution	Homework	Quizzes	Midterm exam	Lab	Team project	Final
	10%	5%	25%	20%	-	40%

Course Relationship to Program Outcome	**Program outcome**	**ABET Outcomes**										
		a	b	c	d	e	f	g	h	i	j	k
	Key	x	x	x	x			x	x			x

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Course Title	**Automation and Control**			
Course No.	**57023304-3**	Credit hours:3	Lectures:2	Lab:3
Prerequisite	Dynamics and Vibrations			
Course Description	The course covers an introduction to linear feedback control theory, mathematical modelling of physical systems, transfer functions, block diagrams and signal flow graph, time domain analysis of control systems, test signals, transient response, time domain specifications, steady-state error and stability. The course also covers sensors, actuators, A/D and D/A conversion, hydraulic and pneumatic systems, Programmable Logic controllers (PLCs) and Computer Integrated Manufacturing (CIM). **Control and Automation Lab** The lab includes experiments and practical training on control of mechanical systems using P/PD/PID controllers, control of x-y table using stepper motors, developing ladder logic programs for PLCs, pneumatic control and servo control systems, control system implementation using related engineering software applications such as Matlab, Lab view, and Simulink, identifying different types of sensors, and CIM (Robotics, Conveyor, and Machine Tools).			
Textbook	Process Control Instrumentation Technology, C. D. Johnson, Prentice Hall (2002) ISBN 0130602485			
Objectives	After successfully completing this course, students will able to demonstrate that they can do the following: - Describe control concepts and strategies and their uses in common industrial applications; - Describe practical applications of control systems; - Construct Bode and Nyquist plots of the open-loop frequency response of a control system; - Interpret the open-loop frequency response with regard to stability and correlate with the time response - Analyse the effects of dead time on system response and performance; - Select and tune PID controllers using a number of techniques; - Discuss common plant automation strategies; - Compare the use of PLCs and robots in plant automation			

	Topic	Duration (weeks)
Outline and Duration	1.Basic Control Concepts: Open- and closed-loop properties of processes; Process loads and lags; Stability of control systems; Block diagrams and P&ID line diagrams; Transfer functions; Laplace Transform; Common control modes (P/PI/PID); Integral saturation and derivative kick; First and second order response.	3
	2. Overview of Control Strategies: Feedback, feed forward, cascade, ratio, split-range, adaptive gain and interlocks; Adaptive control: nonrecursive least squares, recursive least squares, parameter estimation; Linear systems versus non-linear systems; Relay-on/off; Local linearization.	2
	3. System Performance: Frequency Response; Open-loop and closed-loop frequency response; Bode diagrams; Nyquist diagrams; Gain and phase margins; Stability definition and criteria; Correlation with step response; Real versus apparent dead-time effects; Response of 3 controllers to step and ramp functions; Time and frequency domain specifications; Loop-tuning methods by observation and calculation; Auto tuning; Modelling of dynamical systems.	
	4. Automation : Programmable logic controllers (PLCs); Interfacing PLCs to equipment, PCs and networks; Levels of industrial control; Network communications for plant automation; Cell control by PLC networks; Automation strategies: semi-automated, autonomous; Introduction to robotics; Robots versus PLCs in an automated plant; Safety issues; Proximity, tactile, vision, position and other relevant sensors.	4
	5. Control Applications: The functions and types of final control elements used in manufacturing; Motor control systems; Positional control; Distributed process control; Properties of common process unit operations.	2
	Total	**14**

Class Schedule	Two-lecture sessions per week, 50 minutes each plus three hours lab
Contribution to Professional Components	Math and Basic Sciences 0 % Engineering Topics 100 %

	Homework	Quizzes	Midterm exam	Lab	Team project	Final
Grade Distribution	10%	5%	25%	20%	-	40%

		ABET Outcomes										
Course Relationship to Program Outcome	**Program outcome**	a	b	c	d	e	f	g	h	i	j	k
	Key	x	x	x	x			x	x			x

Course Title	**Industrial Systems Simulation**			
Course No.	**57023305-3**	Credit hours:3	Lectures:2	Lab:3
Prerequisite	Engineering Computational Methods			
Course Description	Systems simulation structure, conceptual models; generation of random numbers and random variables; system simulation languages, model verification and validation, design of experiments for simulation runs, output analysis; applications to industrial situations **Industrial Systems Simulation Lab.** The course contains a team simulation project and a lab teaching a higher-level language. Guest lecturers from industry will provide their views of practical project management			
Textbook	Text Book: Simulation with Arena, W. David Kelton, Randall P. Sadowski, and David T. Sturrock, 3rd Ed., 2004, McGraw-Hill.			
Objectives	The objective is to give students a sound understanding of principles and the basic notations - Provide a comprehensive understanding of fundamental simulation concepts and ideas in general and the Arena simulation software in particular. - Ability to study and analyse systems under investigations, and define the statement of the problem under consideration of describing the statistical basis of Control charts for variables and attributes outcomes - Develop a skill to build basic, intermediate, and detailed operation models, analyse input data, verify, validate, well-animate and run these models using Arena simulation software - Develop an ability to design experiments, analyse and interrupt the simulation results, and to present the findings effectively			

Outline and Duration

Topic	Duration (weeks)
1. What is Simulation?	1
2. Fundamental Simulation Concepts	2
3. A Guided Tour through Arena	2
4. Modelling Basic Operations and Input	2
5. Modelling detailed Operations	2
6. Statistical Analysis of Output from Terminating Simulations	1
7. Intermediate Modelling and Steady-State Statistical Analysis	1
8. Entity Transfer	1
9. Further Statistical Issues	1
10. .Conducting Simulation Studies	1
Total	**14**

Class Schedule	Two-lecture sessions per week, 50 minutes each plus three hours lab										
Contribution to Professional Components	Math and Basic Sciences 5 % Engineering Topics 95%										
Grade Distribution	Homework	Quizzes	Midterm exam		Lab	Team project	Final				
	10%	5%	25%		20%	-	40%				
Course Relationship to Program Outcome	**Program outcome**	**ABET Outcomes**									
		a	b	c	d	e	f	g	h	i	j	k
	Key	x	x	x		x			x	x		x

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Course Title	**Industrial Engineering Safety**			
Course No.	**57023401-3**	Credit hours:3	Lectures:3	Lab: 0
Prerequisite	Human Factors Engineering			
Course Description	Study of hazards in the workplace, analytical tools of hazards and accidents, probabilistic concepts, safety and health syloms, national regulations and requirements, hazard control, safety and health management syloms.			
Textbook	Roger L. Brauer, (2006). Safety and Health for Engineers. Second Edition. Hoboken, New Jersey: John Wiley & Sons Inc.			
Objectives	At the end of the course the students will be able to: - Identify unsafe conditions in a typical construction and/or manufacturing workplace. - Analyse control measures for potentially hazardous situations in the workplace - Select engineering controls used to eliminate or reduce unsafe conditions in a given workplace. - Analyse the safety requirements for workers with disabilities. - Evaluate blueprints for unsafe conditions - Develop engineering controls for unsafe conditions in a typical fabrication layout. - Demonstrate engineering principles in designing a manufacturing facility.			

Outline and Duration	**Topic**	**Duration (weeks)**
	1. Describe the safety engineering issues of a typical industrial workplace	2
	2. Evaluate blueprints to predict unsafe conditions for construction and other industrial sites	3
	3. Analyse the safety requirements for workers with disabilities	2
	4. Select applicable safety engineering requirements for equipment, automated lines, systems and/or processes as protective devices	3
	5. Employ safety engineering principles in designing a manufacturing facility	2
	6. Develop engineering controls for unsafe conditions in a typical fabrication layout	2
	Total	**14**

Class Schedule	Three-lecture sessions per week, 50 minutes each
Contribution to Professional Components	Engineering Topics 90% Engineering management 10%

Grade Distribution	Homework	Quizzes	Midterm exam	Lab	Team project	Final
	10%	10%	25%	-	15%	40%

Course Relationship to Program Outcome	**Program outcome**	**ABET Outcomes**										
		a	b	c	d	e	f	g	h	i	j	k
	Key	x	x	x			x		x	x		x

Course Title	**Senior Design Project I**			
Course No.	**57024908-1**	Credit hours:1	Lectures:1	Lab: 0
Prerequisite	Engineering Reports			
Course Description	A group of students is required to prepare a proposal, review relevant literature, develop a work plan, acquire data, conduct preliminary design and feasibility studies and evaluate alternatives in preparation for Senior Design Project II. Teams are also required to submit and present technical progress report.			
Objectives	By the completion of the course, students should be able to: - Understand the need to construct a model of real-life work. - Learn the concepts of planning, careful thought, and critical analysis. - Get Training on reading/ writing/ research skills.			

Outline and Duration	**Topic**	**Duration (weeks)**
	1. Research activities: research strategies, citations, notations, and bibliography.	7
	2. Work activities: all work assigned throughout the course.	7
	Total	**14**

Class Schedule	One-lecture sessions per week 50 minutes.
Contribution to Professional Components	Math and Basic Science 5 % Engineering Topics 80% General Education 15 %

Grade Distribution	Homework	Quizzes	Midterm exam	Lab	Team project	Final
	Continuous Assessment					

Course Relationship to Program Outcome	**Program outcome**	**ABET Outcomes**										
		a	b	c	d	e	f	g	h	i	j	k
	Key	x		x	x		x		x	x	x	x

Course Title	**Logistics and supply chain management**			
Course No.	**57024402-3**	Credit hours:3	Lectures:3	Lab: 0
Prerequisite	Production Planning and Inventory Control			
Course Description	The focus will be on the design, planning, organization and control of the associated activities. The following topics will be covered: supply chain structure, objectives and evaluation drivers and metrics, network design and facility location in a supply chain, demand and sales forecasting, aggregate planning, planning and managing inventory in a supply chain, transportation operations, sourcing and procurement, pricing, and information technologies in supply chain management.			
Textbook	1. Production and Operations Analysis, By Steven Nahmias (McGraw-Hill/Irwin). 2. Supply Chain Management, By S. Chopra and P. Meindl, Prentice-Hall, Inc			
Objectives	At the end of the course the students will be able to: - Properly select & apply forecasting algorithms to demand and supply trends. - Properly apply aggregate production planning, aggregation, and disaggregation of product families. - Properly select and apply models to deterministic and probabilistic inventory systems, materials requirement planning, lot-sizing and capacity planning. - Understand lean supply systems concepts, including JIT (Push/pull systems), lean production concept, supply chain management, lean transport mechanism. - Solve practical warehouse design and configuration problems. - Understand distribution logistics concepts, including logistics network configuration; shipping mechanisms; milk-run/hub system, route selection, cross-docking and transhipment, supply and trucking operations, and shipment tracking. - Understand basics of supply chain software and organizations, timing, policies, and government regulations.			

Outline and Duration

Topic	**Duration (weeks)**
1. Strategy and Competition in Supply Chain System	1
2. Market Characterization: Forecasting	1
3. Aggregate Production Planning	1
4. Hand-out Product Disaggregation	1
5. Basic Inventory Theory—Deterministic Models and Probabilistic	2
6. Lean Supply Systems: JIT/Push, Lean Prod., transport mechanism	1
7. Material Requirement Planning	1
8. Hand-out Lot Sizing Capacity Planning, Hand-out Warehousing: Design & Configuration	2
9. Hand-out Warehousing: Receiving, Delivery, Material Storage	1
10. Hand-out Distribution Logistics: Networks, Shipping mechanism	1
11. Hand-out Milk-run/hub sys routing, Cross-dock, trucking & tracking	1
12. Hand-out Supply Chain Info Technologies	1
Total	**14**

Class Schedule		Three-lecture sessions per week, 50 minutes each									
Contribution to Professional Components		Math and Basic Sciences 0% Engineering Topics 100%									
Grade Distribution	Homework	Quizzes		Midterm exam		Lab	Team project			Final	
	10%	10%		25%		-	15%			40%	
Course Relationship to Program Outcome	**Program outcome**	**ABET Outcomes**									
		a	b	c	d	e	f	g	h	i	j	k
	Key	x			x		x	x	x			x

Course Title	**Industrial Projects Management**			
Course No.	**57024404-3**	Credit hours:3	Lectures:3	Lab: 0
Prerequisite	Organizational and Human Resource Management			
Course Description	The course is focused on planning and control activities in contract-based projects and change projects in several industrial areas. The established project management theory is compared to a number of cases. Starting by providing a basic understanding of the project management discipline and profession, the course goes on to topics such as project planning, project organising and management control and project leadership. Comprehensive integrated planning for all the activities required for project success using the project life cycle. Gantt chart, activity on arrow, activity on node for scheduling time, expenditure, and resources. Time/Cost analysis and resource allocation			
Textbook	Maylor, H. (2005) /Project Management/, 3^{ed} . Harlow: Pearson Education Ltd			
Objectives	At the end of the course the students will be able to: - Describe why and how Project Management can be used to enhance the competitiveness of modern industrial organizations - Describe the structure of Project Management as a field of knowledge and explain basic concepts of the field - Describe the main characteristics and differences of/between industrial delivery projects, product development projects and internal development projects. - Formulate project goals that are realistic, solution-neutral and evaluable - Use tools such as WBS/PBS, OBS, Gantt and PERT/CPM for detailed time planning of a project, and also be able to choose what tools that should/should not be used - Describe basic stage-gate models such as PROPS or PPS - Describe a theoretical risk management process and use simplified tools Describe a project budgeting process and explain the use of Earned Value Management - Explain the relation between projects and permanent organizations, and describe what different solutions that exist in order to alleviate the problems inherent in that relation - Explain the relation between projects and their external environments and apply a stakeholder management process to a specific project - Describe the main tasks and responsibilities of project managers - Analyse a real life project by means of Project Management concepts and tools, and give recommendations on how to improve the management of that project			

	Topic	Duration (weeks)
Outline and Duration	1. Project planning and organising	2
	2. Management control and project leadership	2
	3. Comprehensive integrated planning for all the activities required for project success using the project life cycle	3
	4. Gantt chart, activity on arrow, activity on node for scheduling time	2
	5. Expenditure, and resources	2
	6. Time/Cost analysis and resource allocation	3
	Total	**14**

Class Schedule	Three-lecture sessions per week, 50 minutes each.
Contribution to Professional Components	Math and Basic Sciences 0 % Engineering Topics 100 %

Grade Distribution	Homework	Quizzes	Midterm exam	Lab	Team project	Final
	10%	10%	25%	-	15%	40%

Course Relationship to Program Outcome	**Program outcome**	**ABET Outcomes**									
		a	b	c	d	e	f	g	h	i	j	k
	Key	x		x		x	x	x	x	x		

Course Title	**Senior Design Project II**			
Course No.	**57024909-3**	Credit hours:3	Lectures:3	Lab: 0
Prerequisite	Senior Design Project I			
Course Description	In continuation of Senior Design Project I, the teams work out a complete analysis and design of their projects. Each student in the team is expected to handle a specific task of the project and coordinate his work with the rest of the group. Each team is required to submit its preliminary design with all necessary documents and drawings. At the end of the course, each team is required to deliver a final presentation.			
Objectives	By the completion of the course, students should be able to: - Understand the need to construct a model of real-life work. - Learn the concepts of planning, careful thought, and critical analysis. - Get Training on reading/ writing/ research skills, and follow-through as much as a finished product. - Learning the different research techniques such as field - work measurements, experimental setups, and computational simulations.			

Outline and Duration	**Topic**	**Duration (weeks)**
	1. Research activities: research strategies, citations, notations, and bibliography.	2
	2. Work activities: all work assigned throughout the course.	2
	3. Final Product: model, software, paper, theoretical study	4
	4. Final Report: Written in good technical writing style. Also, a poster and copies of flyer should be prepared.	2
	5. Presentation: Presentation before the Graduation Evaluation Committee. Presentation must be appropriate for department presentation rules and must be suited to the topic.	4
	Total	**14**

Class Schedule	Three lecture sessions per week, 50 minutes each.
Contribution to Professional Components	Math and Basic Sciences 5 % Engineering Topics 95%

Grade Distribution	Homework	Quizzes	Midterm exam	Lab	Team project	Final
	10%	10%	25%	--	15%	40%

Course Relationship to Program Outcome	**Program outcome**	**ABET Outcomes**										
		a	b	c	d	e	f	g	h	i	j	k
	Key	x	x	x	x	x		x	x			x

Course Title	**Reliability and Maintenance Management**			
Course No.	**57024403-3**	Credit hours:3	Lectures:3	Lab: 0
Prerequisite	Production Planning and Inventory Control			
Course Description	M&O organization, M&O strategy, forecasting M&O work, maintenance capacity planning, component replacement decision models, maintenance measurement and standards, scheduling of maintenance, material control, quality of M&O jobs, M&O productivity, maintenance audit, M&O management information systems. Reliability in design, reliability models, reliability assessment during pre-production development and testing, and special problems in maintenance, spare parts, and Markov processes			
Textbook	1. Mann, L., & Knapp, G.M., Maintenance Management, 2008 (self-published course book). 2. Engineering Reliability: Fundamentals and Applications, R. Ramakumar, Prentice-Hall, Inc., 1993			
Objectives	At the end of the course the students will be able to: - To acquaint the student with industrial maintenance systems; - To develop an understanding of how production system concepts apply to the industrial maintenance system; - To be able to correctly analyse and apply strategic improvement processes, specifically Reliability & Weibull Analysis, RCM & FMECA, TBM, PdM, RBI, and TPM; - Properly formulate reliability specifications/ requirements for engineered systems. - Properly formulate and use reliability / availability / maintainability models for use in analysis and prediction. - Develop and execute reliability test plans, and properly analyse their results. - Perform basic analysis of field R&M data. - Perform basic analysis of human hazards, safety, and risks.			

Outline and Duration

Topic	Duration (weeks)
1. Introduction; Maintenance Operations; Maintenance Systems	1
2. Work Order Systems; Job planning	1
3. Maintenance scheduling Maintenance inventory control	1
4. Crafts management	1
5. Time-Based Maintenance (TBM), Predictive Maintenance, (PdM)	1
6. Inspection and other RM programs Maintainability	1
7. Maintenance QC, Total Productive Maintenance (TPM) Maintenance safety management	2

	8. Probability and Random, Variables Basic probability theory, Random variables , Function of random variables	2
	9. Catastrophic Failure Models Reliability functions and their relationships, Hazard function, Failure and failure analysis,	2
	10. Reliability functions, Expected values, Reliability models, Hazard rate & wear out models, Repair and preventive, maintenance models	1
	11. Combinatorial aspects of system reliability, Different Structures, Series/parallel structures, r-out-of-n structure, structure, N-tuple modular structure, Standby redundancy , General techniques for evaluation complex systems , Three-state devices, Time-dependent reliability	2
	Total	**14**

Class Schedule	Three-lecture sessions per week, 50 minutes each					
Contribution to Professional Components	Math and Basic Sciences 0 % Engineering Topics 100%					
Grade Distribu	Homework	Quizzes	Midterm exam	Lab	Team project	Final
	10%	10%	25%	-	15%	40%

Course Relationship to Program	**Program outcome**	**ABET Outcomes**										
		a	b	c	d	e	f	g	h	i	j	k
	Key				x	x	x	x	x			x

Course Title	**Industrial Quality Control**			
Course No.	**57024405-3**	Credit hours:3	Lectures:3	Lab: 0
Prerequisite	Industrial Projects Management			
Course Description	The course is composed of two parts: Statistical quality control and Total Quality Management. The first part includes an Introduction to quality systems, Statistica1 control methods of quality control (SQC) and process control (SPC) such as Histogram distribution method, Control Charts for Variables and Attributes (x-chart, R-chart, p-chart, c-chart), Acceptance Sampling and Process Capability Analysis. Describe the set of statistical tools are used to describe quality characteristics and relationships. The second part covers organizational and procedures issues about the control of process and management information that are required for quality certifications within a general methodology called "Total Quality Management" (TQM). It addresses the quality assurance standards, awards, and the templates (application forms) provided for accreditation and approval of the quality certificates. This covers the definitions and the evolution of the concepts of TQM, the Quality measurement and monitoring, the roles of the Quality Department in planning and improving management performances, and the quality systems such as ISO 9000 and ISO 14000.			
Textbook	1. Introduction to Statistical Quality Control, 4th Edition. Douglas C. Montgomery, John Wiley & Sons, 2001, ISBN 0-471-31648-2 2. Tai, Hamid Abdul Nabiet al., Total Quality Management and ISO, Dar Al-Warraq for Publishing and Distribution, Amman, 2003.			
Objectives	The objective is to give students a sound understanding of: - The Basic Methods Of Statistical Process And Quality Control (SPC, SQC) As problem Solving Tools And Methods For Process Capability Analysis And statistical Inferences - Describing The Statistical Basis Of Control Charts For Variables And Attributes - Developing Team Work For Meeting Challenges In Professional Life - Building Professional Skills And Ethical Behaviour In Professional Life - Recognized International Quality Systems: ISO 9000 And ISO 14000, environmental Quality Systems, Food Quality And Safety System HACPP.. - The Ability To Use Certain Standards In Quality And The Ability To Deal With customer Requirements - Provide Tools That Are Used To Implement Quality Management Systems In any Organization.			

	Topic	**Duration (weeks)**
Outline and Duration	Introduction to Quality Control and Management	1
	Basic Statistical Quality Control Tools: Histogram Frequency Distribution method	1
	Control Charts for Variables : R-chart and X-chart	2

	Control Charts for Attributes : p-chart and c-chart	2
	Acceptance Sampling Plans	1
	Quality-related Process Capability	1
	Statistical Quality Costs Analysis	1
	Principles of Total Quality Management	1
	Methodology of Total Quality Management and application: Standards of information systems and administrative procedures in TQM	2
	Quality Control Program requirements and Tasks: Quality labels and Quality Insurance Systems: ISO 9000 series	2
	Total	**14**

Class Schedule	2-lecture sessions 50 minutes each, 3h lab sessions per week
Contribution to Professional Components	Engineering science 65% Engineering management 35%

Grade Distribution	Homework	Quizzes	Midterm exam	Lab	Team project	Final
	10%	10%	30%	-	10%	40%

Course Relationship to Program Outcome	**Program outcome**	**ABET Outcomes**										
		a	b	c	d	e	f	g	h	i	j	k
	Key				x	x	x	x				x

Course Title	**Facilities Planning and Design**			
Course No.	**57024505-3**	Credit hours:3	Lectures:3	Lab: 0
Prerequisite	Logistics and supply chain management			
Course Description	Strategic facilities planning, location selection، product, process and schedule design, flow, space and activity relationships, personnel requirements, material handling systems (MHS), layout, Computer-Aided Layout, warehouses design project			
Textbook	J.A. Tompkins, J.A. White, Y.A, Bozer, J.M.A. Tanchoco, Facilities Planning, John Wiley & Sons			
Objectives	At the end of the course the students will be able to: - Make the students understand the importance of facility design on the production efficiency of a facility. - Make students understand the relationships between facility design and material handling - Teach students the basic facility design procedure and how to conduct a basic facility design project. - Teach students some of the basic algorithms available in analyzing facility design problems and how to use them - Learn how to analyse and solve facility design problems. - Teach students facility design problems in manufacturing and warehousing to illustrate the application of design			

	Topic	**Duration (weeks)**
Outline and Duration	1. Introduction, Product development process, Production System Supply chain engineering, Material flow	1
	2. Facilities planning and design, Relationships between product, process, and schedule design problems, Product design, Process design and process planning, Schedule design, Machine and personnel	1
	3. Flow analysis, space analysis, and activity relationships, Department formation, Activity relationships, Space requirements	1
	4. Facilities layout and material handling, Introduction & scope of material handling, Objectives of layout and material handling, Basic principles of material handling, Material handling systems design process, Unit load versus bulk handling, Unit load system design,	2
	5. Classification of material of equipment, Types of material handling equipment Requirements calculations	1

	6. Layout design, Types of layouts, Layout design procedure, Qualitative approaches, Multi-floor facility layout, Design for layout changes, Developing layout alternatives, Layout evaluation, selection, & implementation, Specification of evaluation criteria, Evaluate of layout alternatives, Comparison of alternatives, Selection of the preferred alternative	3
	7. Layout Implementation and monitoring, Documentation & presentation, Implementation ,Monitoring and updating Warehouse operation and layout, Models of warehouse layouts, Cube space utilization, Warehouse operations, Storage systems	2
	8. Single facility location models, Minimum problems, Minimax Quadratic assignment problem	1
	9. Manufacturing systems, Types of manufacturing systems, Flow line manufacturing, Batch manufacturing, Job shop manufacturing, Cellular manufacturing systems, Flexible manufacturing systems, Robotic cell, Just-In-Time manufacturing	2
	Total	**14**

Class Schedule	Three-lecture sessions per week, 50 minutes each										
Contribution to Professional Components	Math and Basic Sciences 0 % Engineering Topics 100%										
Grade Distribution	Homework	Quizzes	Midterm exam		Lab		Team project			Final	
	10%	10%	25%		-		15%			40%	
Course Relationship to Program Outcome	**Program outcome**	**ABET Outcomes**									
		a	b	c	d	e	f	g	h	i	j	k
	Key	x	x	x	x	x		x			x	

TECHNICAL ELECTIVES COURSES

Course Title	**Business Systems Modelling and Design**			
Course No.	**57024506-3**	Credit hours: 3	Lectures: 3	Lab: 0
Prerequisite	Industrial System Simulation			
Course Description	This course covers: The development, implementation, and utilization of business models for managerial decision-making, Various techniques for analytical modeling, such as forecasting, optimization, simulation, decision analysis, and classification, are discussed, The concepts and tools that support and define the, information Systems, design and development process			
Textbook	Spread sheet Modelling and Applications: Essentials of Practical Management Science, 1st Ed., South-Western College Pub, 2004			
Objectives	Student will be able to: - Identify and differentiate different model components. - Understand and explain the modelling process AND be able to apply it in a variety of different situations. - Compare and contrast different decision structuring techniques and to use these techniques to analyse various situations. - Evaluate models applying good modelling and validation techniques. - Understand the basic methods and procedures involved in planning and controlling the development and modification of an information system in an organization. - Understand the basic skill levels with computer-aided systems design (CASE) tools and techniques through the completion of class projects using CASE tools. - Develop an appreciation of the benefit of user participation as an equal counterpart in the development of specifications for information systems projects. - Gain practice in communicating ideas in written and oral form.			

Outline and Duration	**Topic**	**Duration (weeks)**
	1. Introduction to Simulation Modelling	3
	2. Regression Models, Go over Exam; Overview of Regression Models, Simple Regression Models ,Multiple Regression Models	2
	3. Forecasting Models, Overview of Time Series Models, Moving Averages Models, Exponential Smoothing Models, The Systems Development Environment,	2
	4. Systems Planning and Selection, Determining System Requirements	2
	5. Structuring System Requirements: Process Modelling, Structuring	1
	6. System Requirements: Conceptual Data Modelling, Selecting the Best Alternative Design Strategy, Designing the Human Interface	2
	7. Designing Databases	1
	8. Systems Implementation and Operation	1
	Total	**14**

Class Schedule		Three lecture sessions per week, 50 minutes each.									
Contribution to Professional Components		Math and Basic Sciences 5 % Engineering Topics 95 %									
Grade Distribution	Homework	Quizzes		Midterm exam		Lab		Team project		Final	
	15%	10%		25%		-		-		50%	
Course Relationship to Program Outcome	**Program outcome**	**ABET Outcomes**									
		a	b	c	d	e	f	g	h	i	j	k
	Key	x		x	x			x	x	x		x

Course Title	**Strategic Planning**			
Course No.	**57024406-3**	Credit hours:3	Lectures:3	Lab: 0
Prerequisite	Organizational and Human Resource Management			
Course Description	This course focuses on nature of strategic planning, development of a strategic plan. Setting vision, mission, and objectives. External evaluation, internal evaluation, analysis and selection of alternatives. Strategy implementation. Strategy review and evaluation.			
Textbook	Strategic Planning for Public and Non-Profit Organizations, John Bryson			
Objectives	Upon completion of this course students will be able to: - Be able to construct a vision of a preferred future that can motivate others and guide actions to bring about the vision - Be aware of values preferences and how they influence futures work - Be aware of and able to apply the tools and techniques of strategic planning - Be able to design and lead an effective meeting - Be familiar with the key ideas of change management			

Outline and Duration	**Topic**	**Duration (weeks)**
	1. Orientation and Values	1
	2. Spiral Dynamics	1
	3. Introduction to Visioning, Approaches to Visioning and Applying: Future Search,	3
	4. Strategic Planning Overview, Facilitation, Organizational Mandates & Mission, Spring Break, SWOT	5
	5. Strategic Issues & Goals, Strategic Initiatives & Cases	2
	6. Leadership and Change, Change Management Principles & Resistance to Change	2
	Total	**14**

Class Schedule	Three-lecture sessions per week, 50 minutes each
Contribution to Professional Components	Engineering management 60 % Engineering science 40%

Grade Distribution	Homework	Quizzes	Midterm exam	Lab	Team project	Final
	15%	10%	25%	-	-	50%

Course Relationship to Program Outcome	**Program outcome**	**ABET Outcomes**										
		a	b	c	d	e	f	g	h	i	j	k
	Key	x		x	x		x	x	x			x

Course Title	**Six Sigma**			
Course No.	57024203-3	Credit hours: 3	Lectures:3	Lab: 0
Prerequisite	Engineering Computational Methods			
Course Description	Six Sigma comprises two frameworks-DMAIC (define, measure, analyse, improve, control) and DMADV (define, measure, analyse, design, verify). This course will cover both lean productions, Forecasting, Material Requirements Planning (MRP), Introduction to Enterprise Requirement Planning (ERP), capacity and aggregate planning, and scheduling			
Textbook	An Introduction to Six Sigma and Process Improvement by James R. Evans and William M. Lindsay , Publisher: South-Western College Pub 2005 ISBN-10: 032430076X & ISBN-13: 978-0324300765			
Objectives	By the completion of the course, the student should be able to: - Basic concepts in quality management, TQM, cost of quality, quality engineering and Six Sigma, review of probability and statistics, Test of Hypothesis. - DMAIC process for process and design improvement, Acceptance Sampling, SPC (Statistical Process Control), process capability, gage reproducibility and repeatability, -Design of experiments, ANOVA, EVOP; fractional, full and orthogonal experiments, regression model building, touchi methods for robust design, six sigma sustainability and case studies.			

Outline and Duration

Topic	Duration (weeks)
1. Six sigma concepts, steps and tools. Quality Function Deployment, QFD example.	2
2. Process evaluation and imp - improvement by design of experiments: Various basic designs; Special methods such as EVOP and ROBUST design (Taguchi Methods).	3
3. Case study of orthogonal array application. Robust design by Taguchi methods. Case study of product design by Taguchi	2
4. DMAIC-Define, measure, analyse, improve and control-the methodology of Six Sigma implementation. DMADV-Define, measure, analyse, design and verify-the methodology for creating high performance designs. Justifying Six Sigma: a manufacturing case. Readiness for Six Sigma assessing the organization	4
5. Case study of initiating Six Sigma DMAIC in manufacturing. TQM vs. Six Sigma-The contrast	3
Total	**14**

Class Schedule	Three lecture sessions per week, 50 minutes.
Contribution to Professional Components	Engineering systems 80 % Engineering design 20%

Grade Distribution	Homework	Quizzes	Midterm exam	Lab	Team project	Final
	15%	10%	25%	-	-	50%

Course Title	**Artificial Intelligence**			
Course No.	**57024204-3**	Credit hours:3	Lectures:3	Lab: 0
Prerequisite	Operations Research(1)			
Course Description	Artificial intelligence (AI) studies how to realize the intelligent human behaviors on a computer. AI is to make a computer/machine capable to learn, plan, and solve problems autonomously. The course covers: problem solving, reasoning based on cases and experiences, planning, automatic programming, machine learning, knowledge-basis management, expert systems, pattern recognition, fuzzy logic, Bayesian and neural networks, genetic and evolutionary algorithms for optimal decision solving. Further, both natural language understanding and computer vision can be solved using methods developed in the field of pattern recognition.			
Textbook	Artificial Intelligence: A Modern Approach (3rd edition). Stuart Russell and Peter Norvig, Prentice Hall (2010)			
Objectives	The main purpose of this course is to provide the most fundamental knowledge to the students so that they can understand what the AI is and can get the full picture of AI concepts and methods. Be able to incorporate AI methods in decision making, pattern recognition, automatic reasoning and diagnosis, intelligent automation and control fields such as robotics, mechatronics, intelligent maintenance and manufacturing systems. Implement a wide variety of both classical and modern AI algorithms.			

	Topic	**Duration (weeks)**
Outline and Duration	1. Introduction to AI: Problem formulation, ontology, agents, rationality, IMS, learning, knowledge basis and reasoning, expert systems,	1
	2. Symbolic logic, Propositional logic, First order predicate logic, Fuzzy logic	1
	3. Other methods for reasoning: cases-based processes, knowledge management, experience plans and returns, learning	2
	4. Knowledge representation and ontologies	1
	5. Multilayer and Self-Organizing Neural Networks, Exact/approximate inference with Bayes networks, Markov logic networks	1
	6. Intelligent agents, multi-agent environments and technique	2
	7. Heuristics search, constraint propagation and backtracking search, evolutionary/genetic algorithms	3
	8. Applications to Pattern Recognition and hierarchical planning	3
	Total	**14**

Class Schedule	Three-lecture sessions per week, 50 minutes each
Contribution to Professional Components	Engineering management 75 % Engineering science 25%

Grade Distribution	Homework	Quizzes	Midterm exam	Lab	Team project	Final						
	10%	10%	30%	-	-	50%						
Course Relationship to Program Outcome	**Program outcome**	**ABET Outcomes**										
		a	b	c	d	e	f	g	h	i	j	k
	Key				x	x	x	x	x			

Course Title	**Advanced Engineering statistics**			
Course No.	**57024008-3**	Credit hours:3	Lectures:3	Lab: 0
Prerequisite	Engineering Statistics and Probability			
Course Description	This course focuses on advanced statistics methods including the specification and estimation of the linear regression model, Gauss-Markov assumptions, serial correlation, and errors in variables, hypothesis tests and specific quantitative tests, econometrics of Panel Data and Time Series Analysis. The course covers also multivariate techniques in management engineering, and applies aspects of quantitative data analysis; including model testing, decision theory.			
Textbook	Wooldridge, J. M. Econometric Analysis of Cross Section and Panel Data. Cambridge, MA: MIT Press, 2001.			
Objectives	The main objectives of the course are to introduce students to basic econometrics techniques and to prepare them to do their own applied work. Students are encouraged to think of the course as a preparation toward their thesis research project. An essential goal of this course is to approach data analysis from the perspective of understanding statistics and their relationship to research rather than focus on mathematics or memorizing formulas.			

Outline and Duration	**Topic**	**Duration (weeks)**
	1. Introduction: The Methods and Applications of Econometrics	1
	2. Multiple Regression, Linear Statistical Model, Tests of Hypothesis, Sampling theory, Consistency, Asymptotic Normality, and Efficiency	2
	3. Non-orthogonality of Repressors and Errors: Correlation Between Repressors and Errors, Errors in Variables, Instrumental Variables and Specification Tests, Khi 2 and Pearson tests	2
	4. Economic Data: Cross Sections, Time Series, and Panel Data, High Frequency and Massive Data Sets Panel Data	1
	5. Nonlinear Specifications, Limited Dependent Variables and Maximum Likelihood Estimation	2
	6. Data Analysis: ANOV and Correlation, Regression and Classification, Cross Validation and Model Selection	2
	7. Time Series Analysis	2
	8. Panel Data Analysis, ARMA and Box-Jenkins methodology	2
	Total	**14**

Class Schedule	Three-lecture sessions per week, 50 minutes each
Contribution to Professional Components	Engineering management 65 % Engineering science 35%

Grade Distribution	Homework	Quizzes	Midterm exam	Lab	Team project	Final
	10%	10%	30%	-	-	50%

Course Relationship to Program Outcome	**Program outcome**	**ABET Outcomes**										
		a	b	c	d	e	f	g	h	i	j	k
					x	x	x	x	x			

Course Title	**Polymers and Plastics Engineering**			
Course No.	57024306-3	Credit hours: 3	Lectures: 3	Lab: 0
Prerequisite	Engineering Materials			
Course Description	Introduction to polymers, basic concepts and terminology, classification of polymers, molecular weight & molecular weight distribution, review of plastic science and engineering fundamentals, process selection, the plastic product design process and material selection			
Textbook	1. Strong, Plastics: Materials and Processing, 3rd Edition, Prentice Hall, (2006) 2. Polymer Science &Technology of Plastics & Rubbers P. Ghosh, Tata McGraw Hill 2nd			
Objectives	By the completion of the course, the student should be able to: - Knowledge of uses techniques of Polymers and plastics processing - Cost polymers and plastics products, including life cycle analysis. - Evaluate company-supplied information for design purposes. - Design of a product made with commercial plastic resins. - Recognition of means to develop life-long learning habits in the area of Polymers and plastics engineering			

	Topic	**Duration (weeks)**
Outline and Duration	1. Introduction to historical background of polymer science, various applications of polymers, raw materials, market and future of polymers, macromolecular concept, structural features of polymers.	1
	2. Basic concepts and terminology: Like monomers, oligomers, telomeres', polymers, low polymers, high polymers, copolymers, functionality, degree of polymerization, thermoplastics, thermosets, elastomers/rubbers, plastics, fibbers, adhesives.	2
	3. Classification of Polymers: Classification based on structure, origin, fabrication, properties etc. linear, branched, and cross-linked polymers etc. classification nomenclature of polymers, crystalline and amorphous polymers, brief idea of polyethylene, polypropylene, polystyrene, polyvinyl chloride, novolac and resol, natural rubber, styrene butadiene rubber, adhesives, fibbers and surface coatings, blends.	2
	4. Molecular Weight & Molecular Weight Distribution: Concept of average molecular weight of polymers molecular weight distribution, mw, mn, mv and mz, polydispersity index	2
	5. Review of Plastic Science and Engineering fundamentals	1

6. Process selection: Extrusion, injection moulding (and variations), thermoforming, blow moulding, rotational moulding, compression moulding (reinforced thermosets), and tooling requirements for each 2 process, cost modelling and injection moulding	
7. The Plastic Product Design Process: From customer needs to commercial product, product specification, material selection, process selection, design for manufacturability, cost analysis, prototyping, design examples: design for stiffness and creep	2
8. Material selection: Data sheets, corporate design references, and environmental resistance of resins, polymer families and additives, life cycle analysis and recycling applications	2
Total	**14**

Class Schedule	Three lecture sessions per week, 50 minutes each.										
Contribution to Professional Components	Engineering Topics 80 % Manufacturing engineering 20 %										
Grade Distribution	Homework	Quizzes	Midterm exam		Lab	Team project		Final			
	15%	10%	25%		-	-		50%			
Course Relationship to Program Outcome	**Program outcome**	**ABET Outcomes**									
		a	b	c	d	e	f	g	h	i	j	k
	Key	x			x			x	x			x

Course Title	**Rapid Prototyping and E-Manufacturing**			
Course No.	**57024202-3**	Credit hours: 3	Lectures: 3	Lab: 0
Prerequisite	CAD/CAM			
Course Description	The course covers the following topics: the generation of suitable CAD models, current rapid prototyping fabrication technologies, and the impact of these technologies on society. The rapid prototyping process will be illustrated by the actual design and fabrication of a part. The major manufacturing processes, materials, and technologies of electronics packaging, surface mount assembly and printed circuit board fabrication. Overview of semiconductor manufacturing and optoelectronics packaging will also be presented.			
Textbook	1. Rafiq Noorani, Rapid Prototyping: Principles and Applications, John Wiley & Sons, Inc., 2006 2. Fundamentals of Microsystems Packaging, Rao R. Tummala, McGraw-Hill; 2001			
Objectives	Student will be able to demonstrate of each of the following areas: 1. Describe the current available rapid prototyping systems, their fundamental operating principles, and their characteristics 2. Select the appropriate fabrication technology, or technologies, for a given prototyping task.			

Outline and Duration	**Topic**	**Duration (weeks)**
	1. Overview of rapid prototyping and automated fabrication technologies: What is a prototype? Why make a prototype? What is automated fabrication? History of numerical control, Process planning; manual, variant, generative	1
	2. Introduction to injection moulding: Introduction to injection moulding, Design for injection moulding, Selecting materials, UL standards	1
	3. Rapid prototyping technologies: Machine tool motion, History of layered manufacturing, Stereo-lithography Solid ground curing, Selective laser sintering, Fused deposition modelling, Laminated object manufacturing, Other systems	2
	4. Generating CAD models suitable for automated fabrication The STL file format, Repairing CAD models, Adding support structures Model slicing	2
	5. Introduction to Electronics Manufacturing, to Printed Wiring Board Assembly	1
	6. Surface Mount Technology, Soldering technology, Packaging types	2
	7. Introduction to PWB Technology (Video: PCB Fab)	2
	8. APEX Show	1
	9. Semiconductor Manufacturing Video: Silicon Run, Introduction to Optoelectronics Packaging	2
	Total	**14**

Class Schedule	Three lecture sessions per week, 50 minutes each.

Contribution to Professional Components		Math and Basic Sciences 50 % Engineering Topics 50 %									
Grade Distribution	Homework	Quizzes	Midterm exam		Lab	Team project		Final			
	15%	10%	25%		-	-		50%			
Course Relationship to Program Outcome	**Program outcome**	**ABET Outcomes**									
		a	b	c	d	e	f	g	h	i	j	k
	Key	x		x	x	x		x	x			x

Course Title	**Design of Industrial Experiments**			
Course No.	**57024307-3**	Credit hours:3	Lectures:3	Lab: 0
Prerequisite	Engineering Statistics and Probability			
Course Description	Principles of experimental design. Randomized complete block designs. Latin square and Greco-Latin square designs. General factorial designs. 2^k Factorial designs, Response surface methodology and robust design. Planning, performing and analysing industrial experiments			
Textbook	Montgomery D.C. (2009), Design and Analysis of Experiments, 7th Ed., John Wiley and Sons, N.Y, ISBN: 978-0-470-39882-1			
Objectives	Upon completion of this course students will be able to: - Appreciate the importance of (DOEs) as an effective approach for improving the quality and performance of various engineering systems and processes - Know how to plan an experiment including the formulation of the problem under-study, the identification of the objectives, the selection of the relevant variables or parameters to be examined & the determination of the appropriate performance measures. - Develop an ability to effectively and efficiently design and execute industrial experiments - Learn the necessary skills for analyzing the experimental data and interpreting the obtained results so that reliable conclusions can be drawn - Obtain a background on how to utilize the Statistical and Engineering knowledge in detecting and modelling the potential causal relationship between the studied variables and the concerned performance measure(s). - Present the results and conclusions drawn using DOE in a clear & proficient manner.			

	Topic	**Duration (weeks)**
Outline and Duration	1. Introduction to DOE, its link to IE & its importance as an approach to product and process improvement	2
	2. Planning experiments and the main steps for employing DOE along with the aids and tools needed for effective applications of DOE	2
	3. Selection of appropriate designs for comparative and factorial experiments	3
	4. Assignments of the factors to the selected design: the concept of full & fractional factorial experiments & confounding (aliasing)	2
	5. Analysing Experimental data: Graphical tools, Half Normal Probability Plot, ANOVA & Regression Analysis, Data	3
	6. Interpreting & presenting experimental results & Case Studies	2
	Total	**14**

Class Schedule	Three-lecture sessions per week, 50 minutes each
Contribution to Professional Components	Engineering management 75 % Engineering science 25%

Grade Distribution	Homework	Quizzes	Midterm exam	Lab	Team project	Final
	15%	10%	25%	-	-	50%

Course Relationship to Program Outcome	**Program outcome**	**ABET Outcomes**									
		a	b	c	d	e	f	g	h	i	j	k
			x				x					

Course Title	**Renewable Energy**			
Course No.	**57024103-3**	Credit hours:3	Lectures:3	Lab: 0
Prerequisite	Fluid and Thermal Science			
[redacted]	This subject is designed for students by providing an introduction to the most important renewable energy resources and the technologies for harnessing these within a framework of a broad range of simple to state-of-the-art advanced energy systems. The subject helps students understand society's present needs and future energy demand by examining both conventional and renewable energy technologies including fossil fuels, nuclear power, solar energy, wind power, biomass energy, hydropower, geothermal energy, etc. and foster the ability to engage in lifelong learning on renewable energy (RE) issues. Unlike fossil fuels, renewable energy sources are sustainable.			
Textbook	Boyle, Godfrey, 2012, Renewable Energy: Power for a Sustainable Future, 3rd edit, Oxford University Press ISBN-13: 978-0199545339			
Objectives	Upon completion of this course, you should be able to: - Understand the difference between renewable and non-renewable energy sources and identify and distinguish between different forms of renewable energy. - Understand the advantages and limitations of different renewable energy sources and identify a wide variety of applications for renewable energy. - Understand the basic scientific and technical principles behind large-scale applications of renewable energy. - Identify selected political, social, and economic incentives that would accelerate the implementation of renewable energy			

	Topic	**Duration (weeks)**
Outline and Duration	1. Conventional Energy Systems: Standard conventional energy provision technologies based on fossil fuel energy, used for comparison	2
	2. Solar Energy : Review methods employed to obtain solar energy, Basic principles of solar thermal and photovoltaic energy conversion	3
	3. Wind Energy: A description of the atmospheric processes that produces wind energy, The fundamental principle of wind turbine operation	2
	4. Hydropower: A discussion of natural resource and its contribution to	2
	5. Bio-Energy: The features of bio-energy and other aspects such as the sustainability concern, economics and potential future for this	3
	6. Geothermal Energy: An overview of geothermal energy including sources of heat and its historical perspective, Review various technologies for geothermal resource exploitation.	2
	Total	**14**

Class Schedule	Three lecture sessions per week, 50 minutes each.										
Contribution to Professional Components	Math and Basic Sciences 25 % Engineering Topics 75%										
Grade Distribution	Homework	Quizzes	Midterm exam		Lab	Team project		Final			
	10%	10%	30%		-	-		50%			
Course Relationship to Program Outcome	**Program outcome**	**ABET Outcomes**									
		a	b	c	d	e	f	g	h	i	j	k
	Key	x	x	x	x							

Program Evaluation as per ABET Requirement

Semesters/ Semester/Year		Course Number	Course Title	Course is Required, R, or Elective, E	Subject Area (Credit Hours)			
					Math & Basic Sciences	Engineering Topics Check if Contains Significant Design (√)	General Education	Others
1st Year	First Semester	48001700-6	English Language	R				6
			General Chemistry	R	4			
		48001400-4	Introduction to Math I	R	4			
		48001004-3	Learning Skills	R				3
	Second Semester	48001701-4	Technical English Language	R			4	
		48001503-3	Computer Programming Skills	R		3		
		48001401-4	Introduction to Math II	R	4			
		48001300-4	General Physics I	R	4			
2nd Year	Third Semester	57011105-3	Statics	R	1	2		
		57001005-4	General Physics II	R	4			
		57021100-2	Engineering Graphics	R		2		
		57001001-3	Differential Equations for Engineers	R	3			
		57002003-3	Engineering Statistics and Probability	R	3			
		28071001-2	Islamic Culture I	R			2	
	Fourth Semester	57001002-3	Linear Algebra for Engineers	R	3			
		57021500-2	Introduction to Industrial Engineering	R		2		
		57021501-3	Work Systems Measurement and Analysis	R		3		
		57021400-3	Organizational and Human Resource Management	R				3
		57031401-3	Circuit Analysis 1	R		3		
		28011001-2	Holly Quran I	R			2	
3rd Year	Fifth Semester	57022101-3	Fluids and Thermal Sciences	R	1	2		
		57022102-3	Dynamics and Vibrations	R		3		
		57022300-3	Engineering Materials	R	1	2		
		57022200-3	Computer Applications in Industrial Systems	R		3		
		57022006-3	Operations Research(1)	R	1	2		
		57012106-1	Engineering Reports	R			1	
		28012001-2	Holly Quran II	R			2	
	Sixth Semester	57003004-3	Engineering Computational Methods	R	2	1		
		57022301-3	Engineering Measurements	R		3		
		57022502-3	Human Factors Engineering	R		3		
		57022302-3	Manufacturing Processes (1)	R		3		

		57022504-3	Production Planning and Inventory Control	R		3		
		28072001-2	Islamic Culture II	R			2	
4th year	Seventh Semester	57023303-3	Manufacturing Processes (2)	R		3√		
		57023007-3	Operations Research(2)	R	1	2		
		57023503-3	Industrial Information Systems	R		3		
		57011104-2	Engineering Economy	R			2	
		57014101-2	Engineering Ethics	R		2		
		28073001-3	Islamic Culture III	R			3	
	Eighth Semester	57023201-3	CAD/CAM	R		3		
		57023304-3	Automation and Control	R		3		
		57023305-3	Industrial Systems Simulation	R		3		
		57023401-3	Industrial Engineering Safety	R		3		
		28021001-2	Arabic Language	R				2
		28071002-2	The Biography of Prophet Muhammad	R				2
5th Year	Ninth Semester	57024908-1	Senior Design Project I	R		1		
		57024402-3	Logistics and Supply Chain Management	R		3		
		57024404-3	Industrial Projects Management	R		3		
		57024xxx-3	Elective I	E		3		
		57024xxx-3	Elective II	E		3		
		28013001-2	Holly Quran III	R			2	
	Tenth Semester	57024909-3	Senior Design Project II	R		3√		
		57024403-3	Reliability and Maintenance Management	R		3		
		57024405-3	Industrial quality control	R		3		
		57024505-3	Facilities Planning and Design	R		3		
		28074001-2	Islamic Culture IV	R			2	
		28014001-2	Holly Quran IV	R			2	
Total ABET Basic Semester Requirements					36	87	24	16
Overall Total Credit Hours for Completion of the Program					**163 + 2 (hours training) = 165**			
Percent of Total					22%	53%	15%	10%
Total Must Satisfy Either Credit Hours or Percentage				Min. Credit	32 Hours	48 Hours		
				Minimum	24%	37.5		