جامعة أم القرى

كلية الهندسة والعمارة الاسلامية

الماجستير في هندسة المساحة

	Applications.		with the students in the class • Mid-Term and final exams
2.3	To write and run algorithms to solve mathematical problems using computers		
2.4	To design numerical methods in solving some mathematical models appearing frequently in the daily life situations		
2.5	To summarize the different types of Transform Calculus and the evaluation of Real Integrals.		
3.0	**Interpersonal Skills & Responsibility**		
3.1	To participate in the discussion and take initiative in asking and answering questions during the lecture.	• The discussion with the students and asking questions during the lecture. • Homework assignments. • Group assignments.	• Instructor's assessment of student's performance through discussions during lectures • Follow up the homework assignments.
3.2	To work individually or in a team		
3.3	To be able to do homework assignments independently.		
4.0	**Communication, Information Technology, Numerical**		
4.1	To write algorithms and solve mathematical problems numerically	• Computer assignments. • Encourage students to train on the available software concerning the course topics.	• Testing of the skills and attributes is through • Follow up the homework assignments and discussing it with students.
4.2	To discuss and compare computational results		
4.3	To use available information technology to access the supporting materials and references.		
5.0	**Psychomotor**		
5.1	Not applicable	Not applicable	Not applicable

5. Schedule of Assessment Tasks for Students During the Semester			
	Assessment task (i.e., essay, test, quizzes, group project, examination, speech, oral presentation, etc.)	**Week Due**	**Proportion of Total Assessment**

1	First Test	6	20 %
2	Computer assignments	Monthly	6 %
3	Quizzes	Monthly	4 %
4	Second Test	12	20 %
5	Final Exam	16 / 17	50 %

D. Student Academic Counseling and Support

1. Arrangements for availability of faculty and teaching staff for individual student consultations and academic counseling. (include the time teaching staff are expected to be available per week)

- 10 scheduled office hours per week
- 5 hours weekly for academic advice through the academic guidance unit in the department.

E Learning Resources

1. List Required Textbooks

- Kreyszing, E., Advanced Engineering Mathematics, Eighth edition, John Wiley.
- Dennis G. Zill& Michael R. Cullen "Advance Engineering Math", 2nd Edition, Jones and Bartlett Publisher.
- Berder, C. &Orszag, S. "Advanced Mathematical Method for Scientists and Engineers",McGraw-Hill.

2. List Essential References Materials (Journals, Reports, etc.)

- MATLAB Primer, http://www.mathworks.com/help/pdf_doc/matlab/getstart.pdf, © COPYRIGHT 1984–2012 by The MathWorks, Inc.
- MATLAB software, http://www.mathworks.com. Purchase a student version or use PCs in the labs.

3. List Electronic Materials, Web Sites, Facebook, Twitter, etc.

- Software such as: Basic, Fortran, C. Maple, Mathematica and MATLAB.
- Web sites involving computational mathematics.

4. Other learning material such as computer-based programs/CD, professional standards or regulations and software.

- A white board & Computer with internet and data show
- In order to do the computer assignments one of the following computer software must be available for the student:
- Basic, Fortran, Maple, Mathematica, MATLAB

F. Facilities Required

Indicate requirements for the course including size of classrooms and laboratories (i.e. number of seats in classrooms and laboratories, extent of computer access, etc.)

1. Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)

- Classroom to accommodate 25 students equipped with usual blackboard or smart board.
- Computer laboratory equipped with hardware and software.

2. Technology resources (AV, data show, Smart Board, software, etc.)

- Computers connected to internet and equipped with required software.

COURSE SPECIFICATIONS

Form

Course Title: **Advanced Numerical and Statistical Methods**.

Course Code: **803601-3**.

Date: 2018-10-19.	Institution: **Umm Al-Qura University**
College: **College of Engineering& Islamic Architecture**	Department: **Civil Engineering**

A. Course Identification and General Information

1. Course title and code: **Advanced Numerical and Statistical Methods, 803601-3**
2. Credit hours: **3**
3. Program(s) in which the course is offered. **Civil Engineering Department**

   (If general elective available in many programs indicate this rather than list programs)

   Master Program in Surveying Engineering
4. Name of faculty member responsible for the course: **Dr. Medhat Moustafa Helal**
5. Level/year at which this course is offered: **Level 2 / 1st Year**
6. Pre-requisites for this course (if any): **803600-3**
7. Co-requisites for this course (if any)
8. Location if not on main campus
9. Mode of Instruction (mark all that apply)

a. Traditional classroom	✓	What percentage?	100
b. Blended (traditional and online)		What percentage?	
c. E-learning		What percentage?	
d. Correspondence		What percentage?	
e. Other		What percentage?	

Comments:

B Objectives

1. The main objective of this course

To develop the skills of the civil engineer to use computers to solve engineering analytical equations by using numerical methods and the basics of statistics science and its applications in the fields of engineering

2. Describe briefly any plans for developing and improving the course that are being implemented. (e.g. increased use of the IT or online reference material, changes in content as a result of new research in the field)

- Encourage students to read certain books about some applications of numerical methods.
- Encourage students to use internet to look for related websites, computer software, and references.
- Train students to write and implement computer algorithms for different problems.

C. Course Description (Note: General description in the form used in the program's bulletin or handbook)

Course Description:

Numbers and their representations - Errors in the calculations – Numerical Methods for solving differential equations of different engineering systems - Data Analysis and Probability Theory, Mathematical Statistics with civil engineering applications are introduced with the computer implementation using MATLAB and SPSS programs.

1. Topics to be Covered

List of Topics	No. of Weeks	Contact Hours
Error Analysis: Errors, Absolute errors, Rounding errors, Truncation errors, Inherent Errors.	1	3
Solution of Linear Systems: Gaussian elimination method with pivoting, LU Decomposition methods. Algorithms and MATLAB programs.	1	3
Algorithm and convergence of Jacobi iterative Method	1	3
Algorithm and convergence of Gauss Seidel Method, Eigenvalue and eigenvector, Power method	1	3
The Solution of Non-Linear Equations: Bisection Method	1	3

Fixed point iterative method, Newton Raphson method	1	3
Secant method, Method of false position, Algorithms and convergence of these methods	1	3
Ordinary Differential Equations: Euler's, Improved Euler's, Modified Euler's methods with error analysis, Runge-Kutta methods with error analysis, Predictor-corrector methods, Finite Difference. Algorithms and programs.	1	3
Interpolation: Lagrange's interpolation, Newton's divided difference interpolation Newton's forward and backward difference interpolation, Central difference interpolation, Hermit interpolation, Spline interpolation, Errors and algorithms of these interpolations. Algorithms and MATLAB programs.	1	3
Numerical Differentiation: Newton's Forward, Backward and central formulae for numerical differentiation. Algorithms and MATLAB programs.	1	3
Numerical Integration: Rectangular rule, Trapezoidal rule, Simpson rule, Boole's rule, Gaussian quadrature formulae, Newton-Cotes formulae. Algorithms and MATLAB programs.	1	3
Numerical methods for solving partial differential equations: Finite difference method, Finite element method. Algorithms and programs.	1	3
Statistics: Random vectors, Bivariate distributions, Independence of random variables, conditional expectation	1	3
Distributions of functions of random variables, Random samples, Distribution of sample mean, Law of large numbers, Central limit theorem, Elementary statistical Inference (estimation and hypothesis testing),	1	3
The probability distributions (t, χ and F), Inference from one sample and two samples.	1	3
Practical part Introduction to SPSS, Creating & Recoding data, Generating Descriptive Statistics [Frequency, Minimum and Maximum Value, Range], Generating Descriptive Statistics [Mean, Median, Mode,	Weekly	45

Variance, Standard Deviation], Generating Graphical Statistics [Histogram, pie chart], Generating Graphical Statistics [Scatter Plots, Box Plot], Test Normality, Independent and paired t-test, Chi-square and Fisher's exact test.		

2. Course components (total contact and credit hours per semester):

		Lecture	Tutorial	Laboratory/ Studio	Practical	Other	Total
Contact Hours	Planned	30			45		75
	Actual						
Credit	Planned	2			1		3
	Actual						

3. Individual study/learning hours expected for students per week. 3

4. Course Learning Outcomes in NQF Domains of Learning and Alignment with Assessment Methods and Teaching Strategies

On the table below are the five NQF Learning Domains, numbered in the left column.

First, insert the suitable and measurable course learning outcomes required in the appropriate learning domains (see suggestions below the table). **Second**, insert supporting teaching strategies that fit and align with the assessment methods and targeted learning outcomes. **Third**, insert appropriate assessment methods that accurately measure and evaluate the learning outcome. Each course learning outcomes, assessment method, and teaching strategy should fit in together with the rest to form an integrated learning and teaching process. (Courses are not required to include learning outcomes from each domain.)

Curriculum Map

Code #	NQF Learning Domains And Course Learning Outcomes	Course Teaching Strategies	Course Assessment Methods
1.0	**Knowledge**		
1.1	To describe different Error Analysis methods	• Introducing the topics in the lectures • Discussions in the class • Homework assignments • Independent study	• Homework assignments • Short exams • Mid-term exams and a final exam
1.2	To define the Solution of Linear Systems		
1.3	To describe The Solution of Non-Linear Equations		

1.4	To state the methods of Ordinary Differential Equations		
1.5	To describe the Interpolation methods		
1.6	To describe Numerical Differentiation and Integration methods		
1.7	To describe Numerical methods for solving partial differential equations		
1.8	To describe The Statistics and probability distributions.		
2.0	**Cognitive Skills**		
2.1	To summarize the different types of errors.	• Lectures • Discussions in the lectures • Homework assignments • Independent study	• Follow up homework assignments • Short exams • Discussions with the students in the class • Mid-Term and final exams
2.2	To analyse the different methods of solving the linear and non-linear systems of equations.		
2.3	To write and run algorithms to solve mathematical problems using computers		
2.4	To design numerical methods in solving some mathematical models appearing frequently in the daily life situations		
2.5	To summarize the different types of statistics and probability distributions.		
3.0	**Interpersonal Skills & Responsibility**		
3.1	To participate in the discussion and take initiative in asking and answering questions during the lecture.	• The discussion with the students and asking questions during the lecture. • Homework assignments. • Group assignments.	• Instructor's assessment of student's performance through discussions during lectures • Follow up the homework
3.2	To work individually or in a team		
3.3	To be able to do homework assignments independently.		

			assignments.
4.0	**Communication, Information Technology, Numerical**		
4.1	To write algorithms and solve mathematical problems numerically	• Computer assignments. • Encourage students to train on the available software concerning the course topics.	• Testing of the skills and attributes is through • Follow up the homework assignments and discussing it with students.
4.2	To discuss and compare computational results		
4.3	To use available information technology to access the supporting materials and references.		
5.0	**Psychomotor**		
5.1	Not applicable	Not applicable	Not applicable

5. Schedule of Assessment Tasks for Students During the Semester

	Assessment task (i.e., essay, test, quizzes, group project, examination, speech, oral presentation, etc.)	Week Due	Proportion of Total Assessment
1	First Test	6	15 %
2	Computer assignments	Monthly	6 %
3	Quizzes	Monthly	4 %
4	Second Test	12	15 %
5	Final Exam (Practical)	14	10 %
6	Final Exam	16 / 17	50 %

D. Student Academic Counseling and Support

1. Arrangements for availability of faculty and teaching staff for individual student consultations and academic counseling. (include the time teaching staff are expected to be available per week)
   - 10 scheduled office hours per week
   - 5 hours weekly for academic advice through the academic guidance unit in the department.

E Learning Resources

1. List Required Textbooks
   - Parviz, Moin "Fundamentals of Engineering Numerical Analysis", Cambridge Univ. Press.
   - Ferziger, Joel H. "Numerical Methods for Engineering Applications", Willy-Inter-science.
   - Terrnce J. Akai "Applied Numerical Methods for Engineers", John Wiley &Sons.

- Decovrsey, W. J. "Statistics and Probability for Engineering Applications with Microsoft Excel", Elsevier Science, USA

2. List Essential References Materials (Journals, Reports, etc.)

- MATLAB Primer, http://www.mathworks.com/help/pdf_doc/matlab/getstart.pdf, © COPYRIGHT 1984–2012 by The MathWorks, Inc.
- MATLAB software, http://www.mathworks.com. Purchase a student version or use PCs in the labs.

3. List Electronic Materials, Web Sites, Facebook, Twitter, etc.

- Software such as: Basic, Fortran, C. Maple, Mathematica and MATLAB.
- Web sites involving computational mathematics.

4. Other learning material such as computer-based programs/CD, professional standards or regulations and software.

- A white board & Computer with internet and data show
- In order to do the computer assignments one of the following computer software must be available for the student:
- Basic, Fortran, Maple, Mathematica, MATLAB

F. Facilities Required

Indicate requirements for the course including size of classrooms and laboratories (i.e. number of seats in classrooms and laboratories, extent of computer access, etc.)

1. Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)

- Classroom to accommodate 25 students equipped with usual blackboard or smart board.
- Computer laboratory equipped with hardware and software.

2. Technology resources (AV, data show, Smart Board, software, etc.)

- Computers connected to internet and equipped with required software.
- Printers.

3. Other resources (specify, e.g. if specific laboratory equipment is required, list requirements or attach list)

A white board & Computer with internet and data show.

Computing Services provides the University IT facilities and infrastructure. General purpose computer resources across campus are open 24 hours and more specialist computer laboratories are provided in partnership with departments. Students in halls of residence are supported in connecting their computers to the high speed network. The University's virtual learning environment "LEARN" provides on and off campus access to web-based teaching materials provided by lecturing staff.

G Course Evaluation and Improvement Procedures

1. Strategies for Obtaining Student's Feedback on Effectiveness of Teaching

Course evaluation by the students at the end of the semester

2. Other Strategies for Evaluation of Teaching by the Instructor or the Department

- Analysing the course evaluation conducted by students at the end of the semester
- Observations of the group of faculty teaching the course.

3. Procedures for Teaching Development • Workshops on teaching and learning methods conducted by the deanship of skills development. • Discussing the teaching methods by the group of faculty members teaching the course at the beginning of each semester.
4. Procedures for Verifying Standards of Student's Achievement (e.g. check marking by an independent member teaching staff of a sample of student's work, periodic exchange and remarking of tests or a sample of assignments with staff members at another institution) Check the marking of a sample of student answer sheets in the final exam by an independent faculty member
5. Describe the planning arrangements for periodically reviewing course effectiveness and planning for developing it. Reviewing the course contents every five years in coordination with the departments in which the course is offered in their programs.

Name of Course Instructor: **Dr. Medhat Moustafa Helal**

Signature: _____ **Date Completed:** _____

Program Coordinator: _____

Signature: _____ **Date Received:** _____

COURSE SPECIFICATIONS

Form

Course Title: **Observations and Adjustment**

Course Code: **803685-3**.

Date: 2018-10-19.	Institution: **Umm Al-Qura University**
College: **College of Engineering& Islamic Architecture**	Department: **Civil Engineering**

A. Course Identification and General Information

1. Course title and code: **Observations and Adjustment, 803685-3**
2. Credit hours: **3**
3. Program(s) in which the course is offered. Civil Engineering Department

   (If general elective available in many programs indicate this rather than list programs)

   Master Program in Surveying Engineering
4. Name of faculty member responsible for the course: **Dr. Khalid El-Ashmawy**
5. Level/year at which this course is offered: **Level 1 / 1st Year**
6. Pre-requisites for this course (if any):
7. Co-requisites for this course (if any)
8. Location if not on main campus
9. Mode of Instruction (mark all that apply)

a. Traditional classroom	✓	What percentage?	100
b. Blended (traditional and online)		What percentage?	
c. E-learning		What percentage?	
d. Correspondence		What percentage?	
e. Other		What percentage?	

Comments:

B Objectives

1. The main objective of this course

This course focuses on introducing the analysis of surveying observations by the least squares method and associated statistical analysis.

By the end of this course, the students will be able to:

- Differentiate between the different types of error.
- Learn the principles and applications of Least Squares Techniques.
- Learn the methods of Intersection and Resection for locating the points.
- Understand the observations and adjustment of level nets.
- Broaden and deepen the knowledge of adjustment of horizontal surveys methods such as trilateration and triangulation.
- Know the simultaneous adjustment of traverses and networks.
- Learn the different methods for two and three dimensional coordinate transformations and its applications.
- Know the error ellipses and its applications in adjustment of observations.
- Methodologies and tools that bring accuracy to surveying and GNSS.

2. Describe briefly any plans for developing and improving the course that are being implemented. (e.g. increased use of the IT or online reference material, changes in content as a result of new research in the field)

- Increasing the number of computers.
- E- learning
- Video conference
- Increased use of IT or web based reference material,
- Changes in content as a result of new research in the field

C. Course Description (Note: General description in the form used in the program's bulletin or handbook)

Course Description:

This course explains the concepts, principles, techniques and applications of using least squares technique for the adjustment of the surveying observations.

Topics include: Principles of least squares, Adjustment of level nets, Adjustment of horizontal surveys: trilateration, triangulation, and traverses and networks, Coordinate transformations, Error ellipse.

1. Topics to be Covered

List of Topics	No. of Weeks	Contact Hours
Introduction: Direct and Indirect Measurements, Measurement Error Sources, Precision versus Accuracy, Redundant Measurements in Surveying and Their Adjustment.	1	3
PRINCIPLES OF LEAST SQUARES: Introduction, Fundamental Principle of Least Squares, Fundamental Principle of Weighted Least Squares, Stochastic Model, Functional Model, Observation Equations, Elementary Example of Observation Equation Adjustment.	1	3
Systematic Formulation of the Normal Equations, Tabular Formation of the Normal Equations, Using Matrices to Form the Normal Equations.	1	3
Least Squares Solution of Nonlinear Systems, Least Squares Adjustment Using Conditional, Least Squares Using Observation Equations.	1	3
ADJUSTMENT OF LEVEL NETS: Introduction, Observation Equation, Reference Standard Deviation.	1	3
ADJUSTMENT OF HORIZONTAL SURVEYS: TRILATERATION: Introduction, Distance Observation Equation, Trilateration Adjustment Example, Formulation of a Generalized Coefficient Matrix for a More Complex Network, Computer Solution of a Trilaterated Quadrilateral, Iteration Termination, Method of Maximum Iterations, Maximum Correction, Monitoring the Adjustment's Reference Variance.	2	6
ADJUSTMENT OF HORIZONTAL SURVEYS: TRIANGULATION: Introduction, Azimuth Observation Equation, Linearization of the Azimuth Observation Equation, Angle Observation Equation, Adjustment of Intersections, Adjustment of Resections, Computing Initial Approximations in the Resection Problem, Adjustment of Triangulated Quadrilaterals.	2	6
ADJUSTMENT OF HORIZONTAL SURVEYS: TRAVERSES AND NETWORKS: Introduction to Traverse Adjustments, Observation Equations, Redundant Equations, Numerical Example, Minimum Amount of Control, Adjustment of Networks.	2	6
COORDINATE TRANSFORMATIONS: Introduction, Two-Dimensional Conformal Coordinate Transformation, Application of Least	1	3

Squares, Two-Dimensional Affine Coordinate Transformation, Two-Dimensional Projective Coordinate Transformation, Three-Dimensional Conformal Coordinate Transformation.		
ERROR ELLIPSE: Introduction, Computation of Ellipse Orientation and Semiaxes, Example Problem of Standard Error Ellipse Calculations, Another Example Problem, Error Ellipse Confidence Level, Error Ellipse Advantages.	1	3
Combining GNSS and Terrestrial Observations: Introduction, The Helmert Transformation, Rotations between Coordinate Systems, Combining GNSS Baseline Vectors with Traditional Observations.	2	6

2. Course components (total contact and credit hours per semester):

		Lecture	Tutorial	Laboratory/ Studio	Practical	Other	Total
Contact Hours	Planned	45					45
	Actual						
Credit	Planned	3					3
	Actual						

3. Individual study/learning hours expected for students per week. 3

4. Course Learning Outcomes in NQF Domains of Learning and Alignment with Assessment Methods and Teaching Strategies

On the table below are the five NQF Learning Domains, numbered in the left column.

First, insert the suitable and measurable course learning outcomes required in the appropriate learning domains (see suggestions below the table). **Second**, insert supporting teaching strategies that fit and align with the assessment methods and targeted learning outcomes. **Third**, insert appropriate assessment methods that accurately measure and evaluate the learning outcome. Each course learning outcomes, assessment method, and teaching strategy should fit in together with the rest to form an integrated learning and teaching process. (Courses are not required to include learning outcomes from each domain.)

Curriculum Map

Code #	NQF Learning Domains And Course Learning Outcomes	Course Teaching Strategies	Course Assessment Methods
1.0	**Knowledge**		
1.1	To describe the principles of Least	• Lectures	• Class works.

	squares technique.	• Training tutorials • Through group project work	• Written examinations. • Reports.
1.2	To recognize the different types of errors.		
1.3	To describe the different method for the adjustment of networks, traverses and triangulations.		
1.4	To describe the different types of coordinates transformations.		
1.5	To outline the error ellipses and its applications in surveying.		
2.0	**Cognitive Skills**		
2.1	To explain the main Concepts, Principles, Techniques of Least squares method.	• Lectures • Training tutorials • Through group project work	• Class works. • Written examinations. • Projects. • Reports.
	To explain the different methods for adjustment of horizontal surveys such as trilateration and triangulation.		
2.2	To justify the simultaneous adjustment of traverses and networks.		
	To reorganize different methods for two and three dimensional coordinates transformations.		
2.3	To explain the Systematic Formulation of the Normal Equations and its applications.		
2.4	To explain the necessity for using error ellipses for analysis of results.		
3.0	**Interpersonal Skills & Responsibility**		
3.1	To show and evaluate the use of Least Squares Technique for observations adjustment.	• Group assignments. • Small group work.	• Class works. • Written examinations. • Projects. • Reports.
3.2	To illustrate and analyze the data and		

	information and overcoming the problems		
3.3	To act professionally and ethically in a team work.		
4.0	**Communication, Information Technology, Numerical**		
4.1	To operate effectively in civil engineering team work.	• Lectures • Training tutorials • Through group project work • Through detailed research and analysis of a particular topic for observations and adjustment.	• Class works. • Written examinations. • Projects. • Reports.
4.2	To illustrate professional written reports, maps, and deliver professional oral and written presentations.		
4.3	To prepare our graduates to work effectively in modes ranging from independent study to multi-disciplinary teams.		
5.0	**Psychomotor**		
5.1	Not applicable	Not applicable	Not applicable

5. Schedule of Assessment Tasks for Students During the Semester

	Assessment task (i.e., essay, test, quizzes, group project, examination, speech, oral presentation, etc.)	Week Due	Proportion of Total Assessment
1	First exam	4	15 %
2	Second exam	8	15 %
3	Third Exam	12	20 %
4	Final Exam	16 /17	50 %

D. Student Academic Counseling and Support

1. Arrangements for availability of faculty and teaching staff for individual student consultations and academic counseling. (include the time teaching staff are expected to be available per week)

- All faculty has allocated tutorial or consultation hours during which the concerned teaching staff is available to provide academic advising to students.
- Generally, five hours are allocated per week and displayed outside office of the concerned teaching staff to facilitate advising to the students.

- New lecturers attend a personalised programme of courses and, in the final year of probation, they assesses their teaching through direct observation and a portfolio.
- Professional Development works directly with staff who wishs to develop more effective teaching and learning methods - including the area of learning technologies - and provides resources to support the learning skills development of students.

E Learning Resources

1. List Required Textbooks
   - GHILANI C. D., WOLF P. R., 2017. ADJUSTMENT COMPUTATIONS: Spatial Data Analysis, 6th Edition. JOHN WILEY & SONS, IN.
   - Mikhail, E. M., 1983. Observations and Least squares. Thomas Y. Crowel Company, Inc.

2. List Essential References Materials (Journals, Reports, etc.)
   - Australian Journal of Geodesy, Photogrammetry and Surveying. Institution of Surveyors, Australia, Canberra. QB301 .A87
   - Geomatics Research Australasia. Institution of Surveyors, Australia, Canberra. QB301 .A87
   - ITC Journal. The International Institute for Aerial Survey and Earth Sciences, Enschede. TA593 .I54
   - ISPRS Journal of Photogrammetry and Remote Sensing. Elsevier, Amsterdam. TA593 .P52

3. List Electronic Materials, Web Sites, Facebook, Twitter, etc.
   - Websites of observations adjustment and surveying Computation.

4. Other learning material such as computer-based programs/CD, professional standards or regulations and software.
   - Latest Software and Techniques for Least Squares Techniques Applications.

F. Facilities Required

Indicate requirements for the course including size of classrooms and laboratories (i.e. number of seats in classrooms and laboratories, extent of computer access, etc.)

1. Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)
   - Classroom to accommodate 15 students equipped with usual blackboard or smart board.
   - Computer laboratory equipped with hardware and software.

2. Technology resources (AV, data show, Smart Board, software, etc.)
   - Computers connected to internet and equipped with required software.
   - Printers.
   - Data show for some work presentation.

3. Other resources (specify, e.g. if specific laboratory equipment is required, list requirements or attach list)

None

G Course Evaluation and Improvement Procedures

1. Strategies for Obtaining Student's Feedback on Effectiveness of Teaching • Student questionnaire at the end of the semester. • Student test result analysis. • Regular feedback from students.
2. Other Strategies for Evaluation of Teaching by the Instructor or the Department • Regular review of the course contents by the related department committee. • Input from visiting professors.
3. Procedures for Teaching Development • Regular updating of learning resources. • Usage of new technologies in presenting the course materials. • Self-learning. • Promote reading of outside materials. • Encouraging students to conduct scientific presentations and group discussions. • Additional training for the staff assist.
4. Procedures for Verifying Standards of Student's Achievement (e.g. check marking by an independent member teaching staff of a sample of student's work, periodic exchange and remarking of tests or a sample of assignments with staff members at another institution) • Check marking by an independent member teaching staff of a sample of student work, periodic exchange and remarking of tests or a sample of assignments with staff at another institution • A review of a sample of student answers by a related department committee. • In-department group review and marking. • External reviewer for a sample of student answering sheets.
5. Describe the planning arrangements for periodically reviewing course effectiveness and planning for developing it. • Regular updating of learning resources. • Usage of new technologies in presenting the course materials. • Regular review of the course content by the related department committee. • Input from external and internal reviewers.

Name of Course Instructor: **Dr. Khalid El-Ashmawy**

Signature: _____ **Date Completed:** _____

Program Coordinator: _____

Signature: _____ **Date Received:** _____

COURSE SPECIFICATIONS

Form

Course Title: **GNSS**

Course Code: **803686-3**.

Date: 2018-10-19.	Institution: **Umm Al-Qura University**
College: **College of Engineering& Islamic Architecture**	Department: **Civil Engineering**

A. Course Identification and General Information

1. Course title and code: **GNSS, 803686-3**
2. Credit hours: **3**
3. Program(s) in which the course is offered. Civil Engineering Department

   (If general elective available in many programs indicate this rather than list programs)

   Master Program in Surveying Engineering
4. Name of faculty member responsible for the course: **Dr. Khalid El-Ashmawy**
5. Level/year at which this course is offered: **Level 1 / 1st Year**
6. Pre-requisites for this course (if any):
7. Co-requisites for this course (if any)
8. Location if not on main campus
9. Mode of Instruction (mark all that apply)

a. Traditional classroom	✓	What percentage?	100
b. Blended (traditional and online)		What percentage?	
c. E-learning		What percentage?	
d. Correspondence		What percentage?	
e. Other		What percentage?	

Comments:

B Objectives

1. The main objective of this course

The course objective is to provide students with:

- An overview of the basic concepts and classification of Geodesy.
- Geodetic measurement techniques, coordinate systems, ellipsoids, and datums.
- The Geodetic and Cartesian coordinates systems, the differences between grid and ground coordinates systems, and the available Geodetic and Cartesian coordinate systems.
- Astronomic and Celestial Coordinate systems and their applications.
- Transformation of coordinates between the discussed systems.
- The different types of Time such as Sidereal Time, Universal Time, Dynamic Time and Atomic Time.
- The concept of GNSS and the different systems, GNSS biases and errors, Positioning using GNSS single point positioning mode.

2. Describe briefly any plans for developing and improving the course that are being implemented. (e.g. increased use of the IT or online reference material, changes in content as a result of new research in the field)

- Increasing the number of computers.
- E- learning
- Video conference
- Increased use of IT or web based reference material,
- Changes in content as a result of new research in the field

C. Course Description (Note: General description in the form used in the program's bulletin or handbook)

Course Description:

Introduction: Preliminary Mathematical Relations, Reference Systems and Frames, The Earth's Shape. Coordinate Systems in Geodesy: The Ellipsoid and Geodetic Coordinates, Ellipsoidal Coordinates, Elementary Differential Geodesy, Direct / Inverse Problem. Transformation Between Geodetic and Cartesian Coordinates. Astronomic Coordinates, Differences Between Geodetic and Astronomic Coordinates. Celestial Coordinates, Horizon System, Equatorial, Right Ascension System, Equatorial, Hour Angle System. Determination of Astronomic Coordinates and Azimuth. Terrestrial Reference System: Horizontal Geodetic Datum, Geodetic Control in the K.S.A., International Terrestrial Reference System. Transformations: Transformations to and Realizations of KSA system of coordinates, Vertical Datums. Celestial Reference System, Relationship to the Terrestrial Frame, Polar Motion, Celestial Ephemeris Pole, Celestial Intermediate Pole, Transformations, Apparent Place Algorithm, Topocentric Place Algorithm. Time: Sidereal Time, Universal Time, Earth Rotation Angle, Dynamic Time, Atomic Time, Determination of Atomic Time.

The concept of GNSS and the different systems, GNSS biases and errors, Positioning using GNSS single point positioning mode.

1. Topics to be Covered

List of Topics	No. of Weeks	Contact Hours
Introduction: Preliminary Mathematical Relations, Reference Systems and Frames, The Earth's Shape	1	3
Coordinate Systems in Geodesy: The Ellipsoid and Geodetic Coordinates, Ellipsoidal Coordinates, Elementary Differential Geodesy, Direct / Inverse Problem.	2	6
Transformation Between Geodetic and Cartesian Coordinates.	1	3
Astronomic Coordinates & Celestial Coordinates: Local Terrestrial Coordinates, Differences Between Geodetic and Astronomic Coordinates.	2	6
Terrestrial Reference System: Horizontal Geodetic Datum, Geodetic Control in the K.S.A., International Terrestrial Reference System and Realizations of KSA system of coordinates, Vertical Datums.	2	6
Time: Sidereal Time, Universal Time, Earth Rotation Angle, Dynamic Time, Atomic Time, Determination of Atomic Time	2	6
Introduction to GNSS: GNSS systems, GNSS Observables	1	3
GNSS Errors and Biases	2	6
GNSS positioning modes: Single Point Positioning	2	6

2. Course components (total contact and credit hours per semester):

		Lecture	Tutorial	Laboratory/ Studio	Practical	Other	Total
Contact Hours	Planned	45					45
	Actual						
Credit	Planned	3					3
	Actual						

3. Individual study/learning hours expected for students per week. 3

4. Course Learning Outcomes in NQF Domains of Learning and Alignment with Assessment Methods and Teaching Strategies

On the table below are the five NQF Learning Domains, numbered in the left column.

First, insert the suitable and measurable course learning outcomes required in the appropriate learning domains (see suggestions below the table). **Second**, insert supporting teaching strategies that fit and align with the assessment methods and targeted learning outcomes. **Third**, insert appropriate assessment methods that accurately measure and evaluate the learning outcome. Each course learning outcomes, assessment method, and teaching strategy should fit in together with the rest to form an integrated learning and teaching process. (Courses are not required to include learning outcomes from each domain.)

Curriculum Map

Code #	NQF Learning Domains And Course Learning Outcomes	Course Teaching Strategies	Course Assessment Methods
1.0	**Knowledge**		
1.1	To recognize the main aspects of Geodesy and GNSS.	• Lectures and training tutorials • Through group project work	• Class works. • Written and oral examinations. • Projects. • Reports.
1.2	To describe the different coordinate systems and applications.		
1.3	To recognize methods of transformation of coordinates between the different systems.		
1.4	To describe the principles of Time and its types and applications.		
2.0	**Cognitive Skills**		
2.1	To explain the main aspects of Geodesy and GNSS and its need and applications.	• Lectures and training tutorials • Through group project work	• Class works. • Written and oral examinations. • Projects. • Reports.
2.2	To explain the systems of coordinates, Datums and methods of coordinates transformation.		
2.3	To calculate the Astronomic and Celestial Coordinates of an object.		
2.4	To compare between the different systems of coordinates and their		

	applications.		
2.5	To summarize the different types of Time such as Sidereal Time, Universal Time, Dynamic Time and Atomic Time.		
2.6	To explain the concept of GNSS and the different systems, GNSS biases and errors, Positioning using GNSS single point mode		
3.0	**Interpersonal Skills & Responsibility**		
3.1	To show and evaluate the problems and issues related to Geodesy, Systems of coordinates and coordinates transformation.	Lectures and training tutorials, home works and exams. Team work projects and report writing	class works, Written and oral examinations
3.2	To illustrate and analyze the data and information and overcoming the problems		
3.3	To act professionally and ethically in a team work.		
4.0	**Communication, Information Technology, Numerical**		
4.1	To operate effectively in civil engineering team work.	• Lectures and training tutorials • Through group project work • Through detailed research and analysis of a particular topic for photogrammetric applications	• Class works. • Written and oral examinations. • Projects. • Reports.
4.2	To illustrate professional written reports, maps, and deliver professional oral and written presentations.		
4.3	To prepare our graduates to work effectively in modes ranging from independent study to multi-disciplinary teams.		
5.0	**Psychomotor**		
5.1	Not applicable	Not applicable	Not applicable

5. Schedule of Assessment Tasks for Students During the Semester			
	Assessment task (i.e., essay, test, quizzes, group project, examination, speech, oral presentation, etc.)	Week Due	Proportion of Total Assessment
1	First exam	4	15 %
2	Second exam	8	15 %
3	Third Exam	12	20 %
4	Final Exam	16 /17	50 %

D. Student Academic Counseling and Support

1. Arrangements for availability of faculty and teaching staff for individual student consultations and academic counseling. (include the time teaching staff are expected to be available per week):

The faculty member answers the questions of the students and provides them with the needed information and references. In addition, the faculty members sort out the academic problems of the students via a meeting with them twice a week in equivalence to 4hrs per week.

E Learning Resources

1. List Required Textbooks

- Jekeli, C., 2012. Geometric Reference Systems in Geodesy. Division of Geodetic Science School of Earth Sciences, Ohio State University, USA.
- Bomford, G., 1971. Geodesy, 3rd edition. Oxford University Press.
- Wellenhof B. H. and Herbert, L. , 2013. GNSS – Global Navigation Satellite Systems. SpringerWien, Newyork, USA.
- Barry F. K. and Gelnnbind, S. J., 2014. Surveying, Principles and Applications. 9th Edition. Prentice Hall.

2. List Essential References Materials (Journals, Reports, etc.)

- Australian Journal of Geodesy, Photogrammetry and Surveying. Institution of Surveyors, Australia, Canberra. QB301 .A87
- Geomatics Research Australasia. Institution of Surveyors, Australia, Canberra. QB301 .A87
- ITC Journal. The International Institute for Aerial Survey and Earth Sciences, Enschede. TA593 .I54
- Journal of Spatial Science. Spatial Sciences Institute Australia. Perth. G70.212 .J68

3. List Electronic Materials, Web Sites, Facebook, Twitter, etc.

- Websites of Geodesy, GPS, GNSS.

4. Other learning material such as computer-based programs/CD, professional standards or regulations and software.

• Latest Software and Techniques for Geodesy and coordinate transformations.

F. Facilities Required

Indicate requirements for the course including size of classrooms and laboratories (i.e. number of seats in classrooms and laboratories, extent of computer access, etc.)
1. Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.) • Classroom to accommodate 15 students equipped with usual blackboard or smart board. • Computer laboratory equipped with hardware and software.
2. Technology resources (AV, data show, Smart Board, software, etc.) • Computers connected to internet and equipped with required software. • Printers. • Data show for some work presentation.
3. Other resources (specify, e.g. if specific laboratory equipment is required, list requirements or attach list) **None**

G Course Evaluation and Improvement Procedures

1. Strategies for Obtaining Student's Feedback on Effectiveness of Teaching • Student questionnaire at the end of the semester. • Student test result analysis. • Regular feedback from students.
2. Other Strategies for Evaluation of Teaching by the Instructor or the Department • Regular review of the course contents by the related department committee. • Input from visiting professors.
3. Procedures for Teaching Development • Regular updating of learning resources. • Usage of new technologies in presenting the course materials. • Self-learning. • Promote reading of outside materials. • Encouraging students to conduct scientific presentations and group discussions. • Additional training for the staff assist.
4. Procedures for Verifying Standards of Student's Achievement (e.g. check marking by an independent member teaching staff of a sample of student's work, periodic exchange and remarking of tests or a sample of assignments with staff members at another institution) • Check marking by an independent member teaching staff of a sample of student work, periodic exchange and remarking of tests or a sample of assignments with staff at another institution • A review of a sample of student answers by a related department committee. • In-department group review and marking. • External reviewer for a sample of student answering sheets.
5. Describe the planning arrangements for periodically reviewing course effectiveness and planning for developing it.

- Regular updating of learning resources.
- Usage of new technologies in presenting the course materials.
- Regular review of the course content by the related department committee.
- Input from external and internal reviewers.

Name of Course Instructor: **Dr. Ali Al-Shaery**

Signature: _____ **Date Completed:** _____

Program Coordinator: _____

Signature: _____ **Date Received:** _____

COURSE SPECIFICATIONS

Form

Course Title: **GIS Applications in Surveying**

Course Code: **803687-3**

Date: 2018-10-19.	Institution: **Umm Al-Qura University**
College: **College of Engineering& Islamic Architecture**	Department: **Civil Engineering**

A. Course Identification and General Information

1. Course title and code: **GIS Applications in Surveying, 803687-3**
2. Credit hours: **3**
3. Program(s) in which the course is offered. **Civil Engineering Department**

   (If general elective available in many programs indicate this rather than list programs)

   Master Program in Surveying Engineering
4. Name of faculty member responsible for the course: **Dr. Khalid El-Ashmawy**
5. Level/year at which this course is offered: **Level 1 / 1st Year**
6. Pre-requisites for this course (if any):
7. Co-requisites for this course (if any)
8. Location if not on main campus
9. Mode of Instruction (mark all that apply)

a. Traditional classroom	✓	What percentage?	100
b. Blended (traditional and online)		What percentage?	
c. E-learning		What percentage?	
d. Correspondence		What percentage?	
e. Other		What percentage?	

Comments:

B Objectives

1. The main objective of this course

To give the students the knowledge and skills in basic methods for collection of geographic data for production and presentation of maps as well as for the solution of geographic analyses using GIS software.

By the end of this course students will be expected to understand:

- The diverse ways in which spatial data and GIS analyses are applied to help people better understand the world around them.
- Sourcing, editing and using spatial data in the applications.
- Good practice for managing spatial data.
- The definition of projections, datums and coordinate systems, and how knowledge of these allows different data sources to be mapped together.
- The importance of metadata to record the source of data, and the degree of precision and uncertainty of spatial or attribute data.
- The difference between raster and vector data formats, and the advantages and disadvantages of each.
- The difference between a GIS layer and the data it represents.

2. Describe briefly any plans for developing and improving the course that are being implemented. (e.g. increased use of the IT or online reference material, changes in content as a result of new research in the field)

- Increasing the number of computers.
- E- learning
- Video conference
- Increased use of IT or web based reference material,
- Changes in content as a result of new research in the field

C. Course Description (Note: General description in the form used in the program's bulletin or handbook)

Course Description:

Covers the basic concepts of geographic information systems, the methods and software used to implement them, and their applications to surveying and analysis of other surveying problems.

1. Topics to be Covered		
List of Topics	**No. of Weeks**	**Contact Hours**
Spatial data and Geographic Information Systems.	1	3
The need for spatial data, maps and GIS.	1	3
Spatial reference systems: studying the reference of the spatial location of objects on the earth's surface, and understanding how this translates to locations on a flat map.	1	3
Representing spatial features: Grasp the difference between discrete spatial objects and continuous surfaces, and learn the characteristics of the two primary data formats (vector and raster) which represent them.	2	6
Interpreting maps: Interpret the symbols, contours and scale on a topographic map.	2	6
Working with raster layers: Experience the power of remotely sensed imagery to visualize environmental patterns.	2	6
Working with vector layers: Generate and edit your own vector data by hand-digitizing, and add non-geographic information to your new layers.	2	6
Introduction to symbology and cartography: Exploring the art of cartography, Changing the way map features are displayed to identify spatial patterns for specific applications.	1	6
Making maps: Studying the key elements of a map (scale bar, legend, graticule) for interpretation of the map, applying cartographic principles in for specific applications.	1	3
Spatial analysis: discovering the utility of GIS that extends far beyond map-making, exploring concepts in spatial analysis that allows to create new data, identify patterns, and support future decision-making.	2	6

2. Course components (total contact and credit hours per semester):							
		Lecture	Tutorial	Laboratory/ Studio	Practical	Other	Total
Contact Hours	Planned	45					45
	Actual						
Credit	Planned	3					3
	Actual						

3. Individual study/learning hours expected for students per week.	3

4. Course Learning Outcomes in NQF Domains of Learning and Alignment with Assessment Methods and Teaching Strategies

On the table below are the five NQF Learning Domains, numbered in the left column.

First, insert the suitable and measurable course learning outcomes required in the appropriate learning domains (see suggestions below the table). **Second**, insert supporting teaching strategies that fit and align with the assessment methods and targeted learning outcomes. **Third**, insert appropriate assessment methods that accurately measure and evaluate the learning outcome. Each course learning outcomes, assessment method, and teaching strategy should fit in together with the rest to form an integrated learning and teaching process. (Courses are not required to include learning outcomes from each domain.)

Curriculum Map

Code #	NQF Learning Domains And Course Learning Outcomes	Course Teaching Strategies	Course Assessment Methods
1.0	**Knowledge**		
1.1	To describe the main aspects of GIS and its major application areas.	• Lectures and training tutorials • Through group project work	• Class works. • Written and oral examinations. • Projects. • Reports.
1.2	To recognize the spatial reference systems, vector and raster layers, making maps and spatial analysis.		
1.3	To recognize the different applications of GIS in surveying.		
1.4	To describe the advantages and disadvantages of using spatial data, maps and GIS.		

2.0	**Cognitive Skills**		
2.1	To explain the main aspects of spatial data, maps and GIS.	• Lectures and training tutorials • Through group project work	• Class works. • Written and oral examinations. • Projects. • Reports.
2.2	To explain the Spatial reference systems and their using for representing spatial features.		
2.3	To summarize the difference between vector and raster layers for representing the spatial data.		
2.4	To explain the spatial analysis for discovering the utility of GIS that extends far beyond map-making, exploring concepts in spatial analysis that allows to create new data, identify patterns, and support future decision-making.		
2.5	To summarize the application fields of GIS especially in surveying.		
3.0	**Interpersonal Skills & Responsibility**		
3.1	To show and evaluate the methods of spatial data, maps and GIS	• Group assignments. • Small group work.	• Class works. • Written and oral examinations. • Projects. • Reports.
3.2	To illustrate and analyze the data and information and overcoming the problems		
3.3	To act professionally and ethically in a team work.		
4.0	**Communication, Information Technology, Numerical**		
4.1	To operate effectively in civil engineering team work.	• Lectures and training tutorials • Through group project work • Through detailed research and analysis of a particular topic for photogrammetric applications	• Class works. • Written and oral examinations. • Projects. • Reports.
4.2	To illustrate professional written reports, maps, and deliver professional oral and written presentations.		
4.3	To prepare our graduates to work		

	effectively in modes ranging from independent study to multi-disciplinary teams.		
5.0	**Psychomotor**		
5.1	Not applicable	Not applicable	Not applicable

5. Schedule of Assessment Tasks for Students During the Semester			
	Assessment task (i.e., essay, test, quizzes, group project, examination, speech, oral presentation, etc.)	**Week Due**	**Proportion of Total Assessment**
1	First exam	4	15 %
2	Second exam	8	15 %
3	Third Exam	12	20 %
4	Final Exam	16 /17	50 %

D. Student Academic Counseling and Support

1. Arrangements for availability of faculty and teaching staff for individual student consultations and academic counseling. (include the time teaching staff are expected to be available per week)

- All faculty has allocated tutorial or consultation hours during which the concerned teaching staff is available to provide academic advising to students.
- Generally, five hours are allocated per week and displayed outside office of the concerned teaching staff to facilitate advising to the students.
- New lecturers attend a personalised programme of courses and, in the final year of probation, they assesses their teaching through direct observation and a portfolio.
- Professional Development works directly with staff who wishs to develop more effective teaching and learning methods - including the area of learning technologies - and provides resources to support the learning skills development of students.

E Learning Resources

1. List Required Textbooks

- Harvey, F., 2016. A PRIMER OF GIS: Fundamental Geographic and Cartographic Concepts. 2nd Edition. The Guilford Press, A Division of Guilford Publications, Inc. 72 Spring Street, New York, NY 10012, USA.

2. List Essential References Materials (Journals, Reports, etc.)

- Geomatics Research Australasia. Institution of Surveyors, Australia, Canberra. QB301 .A87
- ITC Journal. The International Institute for Aerial Survey and Earth Sciences, Enschede. TA593 .I54

• Journal of Spatial Science. Spatial Sciences Institute Australia. Perth. G70.212 .J68 • Photogrammetric Record. Photogrammetric Society, London. TR693 .P46 • Photogrammetric Engineering and Remote Sensing. American Society of Photogrammetry, Falls Church. TA593 .P54
3. List Electronic Materials, Web Sites, Facebook, Twitter, etc. • Websites of GIS and Spatial data.
4. Other learning material such as computer-based programs/CD, professional standards or regulations and software. • Latest Software and Techniques for CAD and GIS.

F. Facilities Required

Indicate requirements for the course including size of classrooms and laboratories (i.e. number of seats in classrooms and laboratories, extent of computer access, etc.)
1. Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.) • Classroom to accommodate 15 students equipped with usual blackboard or smart board. • Computer laboratory equipped with hardware and software.
2. Technology resources (AV, data show, Smart Board, software, etc.) • Computers connected to internet and equipped with required software. • Printers. • Data show for some work presentation.
3. Other resources (specify, e.g. if specific laboratory equipment is required, list requirements or attach list) **None**

G Course Evaluation and Improvement Procedures

1. Strategies for Obtaining Student's Feedback on Effectiveness of Teaching • Student questionnaire at the end of the semester. • Student test result analysis. • Regular feedback from students.
2. Other Strategies for Evaluation of Teaching by the Instructor or the Department • Regular review of the course contents by the related department committee. • Input from visiting professors.
3. Procedures for Teaching Development • Regular updating of learning resources. • Usage of new technologies in presenting the course materials. • Self-learning. • Promote reading of outside materials. • Encouraging students to conduct scientific presentations and group discussions. • Additional training for the staff assist.

4. Procedures for Verifying Standards of Student's Achievement (e.g. check marking by an independent member teaching staff of a sample of student's work, periodic exchange and remarking of tests or a sample of assignments with staff members at another institution) • Check marking by an independent member teaching staff of a sample of student work, periodic exchange and remarking of tests or a sample of assignments with staff at another institution • A review of a sample of student answers by a related department committee. • In-department group review and marking. • External reviewer for a sample of student answering sheets.
5. Describe the planning arrangements for periodically reviewing course effectiveness and planning for developing it. • Regular updating of learning resources. • Usage of new technologies in presenting the course materials. • Regular review of the course content by the related department committee. • Input from external and internal reviewers.

Name of Course Instructor: **Dr. Khalid El-Ashmawy**

Signature: _____ **Date Completed:** _____

Program Coordinator: _____

Signature: _____ **Date Received:** _____

COURSE SPECIFICATIONS

Form

Course Title: **Analytical and Digital Photogrammetry**

Course Code: **803688-3**.

Date: 2018-10-19.	Institution: **Umm Al-Qura University**
College: **College of Engineering& Islamic Architecture**	Department: **Civil Engineering**

A. Course Identification and General Information

1. Course title and code: **Analytical and Digital Photogrammetry, 803688-3**
2. Credit hours: **3**
3. Program(s) in which the course is offered. **Civil Engineering Department**

   (If general elective available in many programs indicate this rather than list programs)

   Master Program in Surveying Engineering
4. Name of faculty member responsible for the course: **Dr. Khalid El-Ashmawy**
5. Level/year at which this course is offered: **Level 2 / 1st Year**
6. Pre-requisites for this course (if any): **803686-3**
7. Co-requisites for this course (if any)
8. Location if not on main campus
9. Mode of Instruction (mark all that apply)

a. Traditional classroom	✓	What percentage?	100
b. Blended (traditional and online)		What percentage?	
c. E-learning		What percentage?	
d. Correspondence		What percentage?	
e. Other		What percentage?	

Comments:

B Objectives

1. The main objective of this course

- Ability to study the mathematical and geometric models of modern photogrammetry.
- Ability to cover the principles of stereoscopic vision, collinearity, coplanarity, epipolar geometry, ground control densification and extension by analytical aerotriangulation.
- Ability to explore automation in photogrammetric procedures - digital aerotriangulation, automated data capture.

2. Describe briefly any plans for developing and improving the course that are being implemented. (e.g. increased use of the IT or online reference material, changes in content as a result of new research in the field)

- Increasing the number of computers.
- E- learning
- Video conference
- Increased use of IT or web based reference material,
- Changes in content as a result of new research in the field

C. Course Description (Note: General description in the form used in the program's bulletin or handbook)

Course Description:

Photogrammetric Cameras, Photographic Processes, Elements of Analytical Photogrammetry, Photo coordinates measurements and refinement , analytical camera calibration, aerotriangulation process, Sequential block adjustment, bundle block adjustment. This course also provides an overview of digital photogrammetry, analytical plotters and Digital Photogrammetric Workstations (DPWs).

1. Topics to be Covered

List of Topics	No. of Weeks	Contact Hours
Film-based Cameras: Photogrammetric Cameras, Photographic Processes,	1	3
Digital Cameras: Overview, CCD Sensors: Working Principle and Properties	1	3
Properties of Aerial Photography: Introduction, Classification of	1	3

aerial photographs, Geometric properties of aerial photographs		
Elements of Analytical Photogrammetry: Introduction, Concept of Image and Object Space, Coordinate Systems,	1	3
Photo coordinates measurements and refinement	1	3
Interior Orientation: analytical camera calibration	1	3
Camera Exterior Orientation	1	3
Orientation of a Stereopair	1	3
Aerotriangulation: Sequential block adjustment	1	3
Aerotriangulation: Bundle block adjustment	1	3
Measuring Systems: Analytical Plotters, Background, System Overview, Basic Functionality, Typical Work flow, Advantages of Analytical Plotters	2	6
Measuring Systems : Digital Photogrammetric Workstations (DPWs), Background, Basic System Components, Basic System Functionality	2	6
Analytical Plotters vs. DPWs	1	3

2. Course components (total contact and credit hours per semester):

		Lecture	Tutorial	Laboratory/ Studio	Practical	Other	Total
Contact Hours	Planned	45					45
	Actual						
Credit	Planned	3					3
	Actual						

3. Individual study/learning hours expected for students per week. 3

4. Course Learning Outcomes in NQF Domains of Learning and Alignment with Assessment Methods and Teaching Strategies

On the table below are the five NQF Learning Domains, numbered in the left column.

First, insert the suitable and measurable course learning outcomes required in the appropriate learning domains (see suggestions below the table). **Second**, insert supporting teaching strategies

that fit and align with the assessment methods and targeted learning outcomes. **Third**, insert appropriate assessment methods that accurately measure and evaluate the learning outcome. Each course learning outcomes, assessment method, and teaching strategy should fit in together with the rest to form an integrated learning and teaching process. (Courses are not required to include learning outcomes from each domain.)

Curriculum Map

Code #	NQF Learning Domains And Course Learning Outcomes	Course Teaching Strategies	Course Assessment Methods
1.0	**Knowledge**		
1.1	To inform the student about the main applications of photogrammetry	• Lectures and training tutorials • Through group project work	• Class works. • Written and oral examinations. • Projects. • Reports.
1.2	To recognize principles of analytical and digital photogrammetry and their advantages and disadvantages.		
1.3	To recognize methods of aerotriangulation and and its application for control points extension		
1.4	To recognize methods of block adjustments		
2.0	**Cognitive Skills**		
2.1	To explain the basics of photogrammetry and its importance and applications.	• Lectures and training tutorials • Through group project work	• Class works. • Written and oral examinations. • Projects. • Reports.
2.2	To inform the student about the analytical and digital photogrammetry		
2.3	To calculate the parameters of interior and exterior orientations of photographs.		
2.4	To perform sequential and bundle block adjustments.		
2.5	Team work in project and writing reports		

3.0	**Interpersonal Skills & Responsibility**		
3.1	To increase the ability to understand problems and issues related to Surveying, Photogrammetry, Mapping and computations.	• Group assignments. • Small group work.	• Class works. • Written and oral examinations. • Projects. • Reports.
3.2	To interpret the data and information and overcoming the problems		
3.3	To act professionally and ethically in a team work.		
4.0	**Communication, Information Technology, Numerical**		
4.1	To function effectively in civil engineering team work.	• Lectures and training tutorials • Through group project work • Through detailed research and analysis of a particular topic for photogrammetric applications	• Class works. • Written and oral examinations. • Projects. • Reports.
4.2	To prepare professional written reports, maps, and deliver professional oral and written presentations.		
4.3	To prepare our graduates to work effectively in modes ranging from independent study to multi-disciplinary teams.		
5.0	**Psychomotor**		
5.1	Not applicable	Not applicable	Not applicable

5. Schedule of Assessment Tasks for Students During the Semester

	Assessment task (i.e., essay, test, quizzes, group project, examination, speech, oral presentation, etc.)	Week Due	Proportion of Total Assessment
1	First exam	4	15 %
2	Second exam	8	15 %
3	Third Exam	12	20 %
4	Final Exam	16 /17	50 %

D. Student Academic Counseling and Support

1. Arrangements for availability of faculty and teaching staff for individual student consultations and academic counseling. (include the time teaching staff are expected to be available per week)
   - All faculty has allocated tutorial or consultation hours during which the concerned teaching staff is available to provide academic advising to students.
   - Generally, five hours are allocated per week and displayed outside office of the concerned teaching staff to facilitate advising to the students.

E Learning Resources

1. List Required Textbooks
   - Mikhail, E.M., J.S. Bethel and J.C. McGlone, 2012. Introduction to modern photogrammetry. John Wiley & Sons, New York. TR693 .M55 2001.
   - Linder, W. (2006). Digital photogrammetry. A practical course. Springer-Verlag, Berlin. TA593 .L45 2006 and online via Library link.
   - Wolf, P.R. and B.A. Dewitt, 2014. Elements of photogrammetry with applications in GIS. 4th edition, McGraw-Hill.

2. List Essential References Materials (Journals, Reports, etc.)
   - Australian Journal of Geodesy, Photogrammetry and Surveying. Institution of Surveyors, Australia, Canberra. QB301 .A87
   - Geomatics Research Australasia. Institution of Surveyors, Australia, Canberra. QB301 .A87
   - ITC Journal. The International Institute for Aerial Survey and Earth Sciences, Enschede. TA593 .I54
   - ISPRS Journal of Photogrammetry and Remote Sensing. Elsevier, Amsterdam. TA593 .P52
   - Journal of Spatial Science. Spatial Sciences Institute Australia. Perth. G70.212 .J68
   - Photogrammetric Record. Photogrammetric Society, London. TR693 .P46
   - Photogrammetric Engineering and Remote Sensing. American Society of Photogrammetry, Falls Church. TA593 .P54

3. List Electronic Materials, Web Sites, Facebook, Twitter, etc.
   - Websites of photogrammetry.

4. Other learning material such as computer-based programs/CD, professional standards or regulations and software.
   - Latest Software and Techniques for photogrammetry.

F. Facilities Required

Indicate requirements for the course including size of classrooms and laboratories (i.e. number of seats in classrooms and laboratories, extent of computer access, etc.)

1. Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)
   - Classroom to accommodate 15 students equipped with usual blackboard or smart board.
   - Computer laboratory equipped with hardware and software.

2. Technology resources (AV, data show, Smart Board, software, etc.)
   - Computers connected to internet and equipped with required software.

• Printers. • Data show for some work presentation.
3. Other resources (specify, e.g. if specific laboratory equipment is required, list requirements or attach list) **None**

G Course Evaluation and Improvement Procedures

1. Strategies for Obtaining Student's Feedback on Effectiveness of Teaching • Student questionnaire at the end of the semester. • Student test result analysis. • Regular feedback from students.
2. Other Strategies for Evaluation of Teaching by the Instructor or the Department • Regular review of the course contents by the related department committee. • Input from visiting professors.
3. Procedures for Teaching Development • Regular updating of learning resources. • Usage of new technologies in presenting the course materials. • Self-learning. • Promote reading of outside materials. • Encouraging students to conduct scientific presentations and group discussions. • Additional training for the staff assist.
4. Procedures for Verifying Standards of Student's Achievement (e.g. check marking by an independent member teaching staff of a sample of student's work, periodic exchange and remarking of tests or a sample of assignments with staff members at another institution) • Check marking by an independent member teaching staff of a sample of student work, periodic exchange and remarking of tests or a sample of assignments with staff at another institution • A review of a sample of student answers by a related department committee. • In-department group review and marking. • External reviewer for a sample of student answering sheets.
5. Describe the planning arrangements for periodically reviewing course effectiveness and planning for developing it. • Regular updating of learning resources. • Usage of new technologies in presenting the course materials. • Regular review of the course content by the related department committee. • Input from external and internal reviewers.

Name of Course Instructor: **Dr. Khalid El-Ashmawy**

Signature: _____ **Date Completed:** _____

Program Coordinator: _____

Signature: _____ **Date Received:** _____

COURSE SPECIFICATIONS

Form

Course Title: **Advanced GNSS**

Course Code: **803689-3**.

Date: 2018-10-19.	Institution: **Umm Al-Qura University**
College: **College of Engineering& Islamic Architecture**	Department: **Civil Engineering**

A. Course Identification and General Information

1. Course title and code: **Advanced GNSS, 803689-3**
2. Credit hours: **3**
3. Program(s) in which the course is offered. Civil Engineering Department

   (If general elective available in many programs indicate this rather than list programs)

   Master Program in Surveying Engineering
4. Name of faculty member responsible for the course: **Dr. Ali Al-Shaery**
5. Level/year at which this course is offered: **Level 2 / 1st Year**
6. Pre-requisites for this course (if any): **803686-3**
7. Co-requisites for this course (if any)
8. Location if not on main campus
9. Mode of Instruction (mark all that apply)

a. Traditional classroom	✓	What percentage?	100
b. Blended (traditional and online)		What percentage?	
c. E-learning		What percentage?	
d. Correspondence		What percentage?	
e. Other		What percentage?	

Comments:

B Objectives

1. The main objective of this course

By the end of this course, the students will be able to:

- Know how GNSS system works.
- Learn about the professional application of the use of GNSS for positioning and then its implementation in civil engineering fields.
- Compare between the different methods of different GNSS operation modes, which include static, rapid static, stop-go, kinematic, kinematic on-the-fly, realtime and non-realtime.
- Learn the detailed GNSS data processing techniques and ambiguity resolution.
- Understand the different GNSS reference station networks in Kingdom of Saudi Arabia and GNSS applications
- Broaden and deepen the knowledge of the study of other satellite navigation techniques such as Transit Doppler.

2. Describe briefly any plans for developing and improving the course that are being implemented. (e.g. increased use of the IT or online reference material, changes in content as a result of new research in the field)

- Increasing the number of computers.
- E- learning
- Video conference
- Increased use of IT or web based reference material,
- Changes in content as a result of new research in the field

C. Course Description (Note: General description in the form used in the program's bulletin or handbook)

Course Description:

This course explains the concepts, principles, techniques and applications of using GNSS especially GPS system. Topics include: A review of different GNSS operation modes. GNSS data processing procedure. High precision GNSS positioning . GNSS datums and reference frames. Network Adjustment and analysis using satellite-based baseline data. Detailed GNSS data processing techniques and ambiguity resolution. GNSS reference station networks in Kingdom of Saudi Arabia and its applications. The study of other satellite navigation techniques such as Transit Doppler.

1. Topics to be Covered		
List of Topics	**No. of Weeks**	**Contact Hours**
A review of different GNSS operation modes, which include static, rapid static, stop-go, kinematic, kinematic on-the-fly, realtime and non-realtime;	2	3
Explanation of GNSS data processing procedure using carrier phase and the concept of ambiguity resolution.	1	3
High precision GPS positioning including inter-mixing different GNSS antenna types, mixing RINEX data, using Precise Ephemeris, utilizing RTCM messages and NMEA strings	2	3
GNSS datums and reference frames.	1	3
Network Adjustment and analysis using satellite-based baseline data	2	3
Detailed GNSS data processing techniques and ambiguity resolution.	2	6
Different GNSS reference station networks in Kingdom of Saudi Arabia.		
Applications fields of high precision GNSS.	1	
Demonstration of the applications of GNSS for monitoring structural deformations.	2	6
Study of other satellite navigation techniques such as Transit Doppler.	2	3
Practical part: • Know how GNSS system works. • Using the different methods of different GNSS operation modes, which include static, rapid static, stop-go, kinematic, kinematic on-the-fly, realtime and non-realtime. • Learn the detailed GNSS data processing techniques and ambiguity resolution.	Weekly	45

2. Course components (total contact and credit hours per semester):							
		Lecture	Tutorial	Laboratory/ Studio	Practical	Other	Total
Contact Hours	Planned	30			45		75
	Actual						
Credit	Planned	2			1		3
	Actual						

3. Individual study/learning hours expected for students per week.	3

4. Course Learning Outcomes in NQF Domains of Learning and Alignment with Assessment Methods and Teaching Strategies

On the table below are the five NQF Learning Domains, numbered in the left column.

First, insert the suitable and measurable course learning outcomes required in the appropriate learning domains (see suggestions below the table). **Second**, insert supporting teaching strategies that fit and align with the assessment methods and targeted learning outcomes. **Third**, insert appropriate assessment methods that accurately measure and evaluate the learning outcome. Each course learning outcomes, assessment method, and teaching strategy should fit in together with the rest to form an integrated learning and teaching process. (Courses are not required to include learning outcomes from each domain.)

Curriculum Map

Code #	NQF Learning Domains And Course Learning Outcomes	Course Teaching Strategies	Course Assessment Methods
1.0	**Knowledge**		
1.1	To describe the main aspects of GNSS systems.	• Lectures and training tutorials • Through group project work	• Class works. • Written and oral examinations. • Projects. • Reports.
1.2	To recognize the different GNSS operation modes.		
1.3	To describe GNSS data processing techniques and ambiguity resolution will be studied		
1.4	To describe the applications areas of GNSS		
1.5	To outline the other satellite navigation techniques such as Transit		

	Doppler.		
2.0	**Cognitive Skills**		
2.1	To explain the main Concepts, Principles, Techniques of GNSS.	• Lectures and training tutorials • Through group project work	• Class works. • Written and oral examinations. • Projects. • Reports.
	To explain the different GNSS operation modes, which include static, rapid static, stop-go, kinematic, kinematic on-the-fly, realtime and non-realtime; and GPS data processing procedure.		
2.2	To justify high precision GNSS positioning including inter-mixing different GNSS antenna types, mixing RINEX data, using Precise Ephemeris, utilizing RTCM messages and NMEA strings		
	To reorganize different GNSS reference station networks in Kingdom of Saudi Arabia and GNSS applications.		
2.3	To explain the GNSS application for monitoring of deformation.		
2.4	To compare between GNSS and other satellite navigation techniques such as Transit Doppler.		
3.0	**Interpersonal Skills & Responsibility**		
3.1	To show and evaluate the use of GNSS and other satellite navigation techniques.	• Group assignments. • Small group work.	• Class works. • Written and oral examinations. • Projects. • Reports.
3.2	To illustrate and analyze the data and information and overcoming the problems		
3.3	To act professionally and ethically in a team work.		

4.0	**Communication, Information Technology, Numerical**		
4.1	To operate effectively in civil engineering team work.	• Lectures and training tutorials • Through group project work • Through detailed research and analysis of a particular topic for GNSS applications	• Class works. • Written and oral examinations. • Projects. • Reports.
4.2	To illustrate professional written reports, maps, and deliver professional oral and written presentations.		
4.3	To prepare our graduates to work effectively in modes ranging from independent study to multi-disciplinary teams.		
5.0	**Psychomotor**		
5.1	Not applicable	Not applicable	Not applicable

5. Schedule of Assessment Tasks for Students During the Semester

	Assessment task (i.e., essay, test, quizzes, group project, examination, speech, oral presentation, etc.)	Week Due	Proportion of Total Assessment
1	First exam	4	10 %
2	Second exam	8	10 %
3	Third Exam	12	15 %
4	Final Exam (Practical)	14	15 %
5	Final Exam	16 /17	50 %

D. Student Academic Counseling and Support

1. Arrangements for availability of faculty and teaching staff for individual student consultations and academic counseling. (include the time teaching staff are expected to be available per week)

- All faculty has allocated tutorial or consultation hours during which the concerned teaching staff is available to provide academic advising to students.
- Generally, five hours are allocated per week and displayed outside office of the concerned teaching staff to facilitate advising to the students.
- New lecturers attend a personalised programme of courses and, in the final year of probation, they assesses their teaching through direct observation and a portfolio.
- Professional Development works directly with staff who wishs to develop more effective teaching and learning methods - including the area of learning technologies - and provides resources to support the learning skills development of students.

E Learning Resources

1. List Required Textbooks

- Wellenhof B. H. and Herbert, L. , 2013. GNSS – Global Navigation Satellite Systems. SpringerWien, Newyork, USA.
- Ogundare , J. O., 2016. Precision Surveying: The Principles and Geomatics Practice. John Wiley & Sons, Inc.
- Sickle, J. V., 2015. GPS for Land Surveyors, 4th Edition. CRC Press.
- Ghosh, J. K., 2015. A Text Book on GPS Surveying, First edition. CreateSpace Independent Publishing Platform.
- Leick A., Rapoport L. and Tatarnikov D., 2015. GPS Satellite Surveying, 4th Edition. Wiley.

2. List Essential References Materials (Journals, Reports, etc.)

- Australian Journal of Geodesy, Photogrammetry and Surveying. Institution of Surveyors, Australia, Canberra. QB301 .A87
- Geomatics Research Australasia. Institution of Surveyors, Australia, Canberra. QB301 .A87
- ITC Journal. The International Institute for Aerial Survey and Earth Sciences, Enschede. TA593 .I54
- ISPRS Journal of Photogrammetry and Remote Sensing. Elsevier, Amsterdam. TA593 .P52

3. List Electronic Materials, Web Sites, Facebook, Twitter, etc.

- Websites of GNSS and GPS.

4. Other learning material such as computer-based programs/CD, professional standards or regulations and software.

- Latest Software and Techniques for GPS Applications.

F. Facilities Required

Indicate requirements for the course including size of classrooms and laboratories (i.e. number of seats in classrooms and laboratories, extent of computer access, etc.)

1. Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)

- Classroom to accommodate 15 students equipped with usual blackboard or smart board.
- Computer laboratory equipped with hardware and software.

2. Technology resources (AV, data show, Smart Board, software, etc.)

- Computers connected to internet and equipped with required software.
- Printers.
- Data show for some work presentation.

3. Other resources (specify, e.g. if specific laboratory equipment is required, list requirements or attach list)

None

G Course Evaluation and Improvement Procedures

1. Strategies for Obtaining Student's Feedback on Effectiveness of Teaching

- Student questionnaire at the end of the semester.
- Student test result analysis.
- Regular feedback from students.

2. Other Strategies for Evaluation of Teaching by the Instructor or the Department

- Regular review of the course contents by the related department committee.

• Input from visiting professors.
3. Procedures for Teaching Development • Regular updating of learning resources. • Usage of new technologies in presenting the course materials. • Self-learning. • Promote reading of outside materials. • Encouraging students to conduct scientific presentations and group discussions. • Additional training for the staff assist.
4. Procedures for Verifying Standards of Student's Achievement (e.g. check marking by an independent member teaching staff of a sample of student's work, periodic exchange and remarking of tests or a sample of assignments with staff members at another institution) • Check marking by an independent member teaching staff of a sample of student work, periodic exchange and remarking of tests or a sample of assignments with staff at another institution • A review of a sample of student answers by a related department committee. • In-department group review and marking. • External reviewer for a sample of student answering sheets.
5. Describe the planning arrangements for periodically reviewing course effectiveness and planning for developing it. • Regular updating of learning resources. • Usage of new technologies in presenting the course materials. • Regular review of the course content by the related department committee. • Input from external and internal reviewers.

Name of Course Instructor: **Dr. Ali Al-Shaery**

Signature: _____ **Date Completed:** _____

Program Coordinator: _____

Signature: _____ **Date Received:** _____

COURSE SPECIFICATIONS

Form

Course Title: **Remote Sensing**

Course Code: **803690–3**.

Date: 2018-10-19.	Institution: **Umm Al-Qura University**
College: **College of Engineering& Islamic Architecture**	Department: **Civil Engineering**

A. Course Identification and General Information

1. Course title and code: **Remote Sensing, 803690-3**
2. Credit hours: **3**
3. Program(s) in which the course is offered. Civil Engineering Department

   (If general elective available in many programs indicate this rather than list programs)

   Master Program in Surveying Engineering
4. Name of faculty member responsible for the course: **Dr. Khalid El-Ashmawy**
5. Level/year at which this course is offered: **Level 2 / 1st Year**
6. Pre-requisites for this course (if any):
7. Co-requisites for this course (if any)
8. Location if not on main campus
9. Mode of Instruction (mark all that apply)

a. Traditional classroom	✓	What percentage?	100
b. Blended (traditional and online)		What percentage?	
c. E-learning		What percentage?	
d. Correspondence		What percentage?	
e. Other		What percentage?	

Comments:

B Objectives

1. The main objective of this course

On completion of the course, the students shall have acquired the following:

- The basic physical principles of remote sensing,
- The basic technical principles of satellites, sensors and ground segments in data collection and the properties of the available data from these systems,
- The principles of digital image processing and manipulation in remote sensing,
- Important applications for satellite remote sensing in research and the public and private sectors.
- The ability to give examples of and suggest uses for remote sensing in different climate zones and for various types of ecosystems and land-usages and to understand and describe the limitations of the technology currently in use.

2. Describe briefly any plans for developing and improving the course that are being implemented. (e.g. increased use of the IT or online reference material, changes in content as a result of new research in the field)

- Increasing the number of computers.
- E- learning
- Video conference
- Increased use of IT or web based reference material,
- Changes in content as a result of new research in the field

C. Course Description (Note: General description in the form used in the program's bulletin or handbook)

Course Description:

PART I: Fundamentals & Physics of Remote Sensing: Concept and Scope of Remote Sensing, Concept of Electromagnetic Radiation (EMR), Fundamental laws governing the science, Energy Interaction in the atmosphere, Energy Interactions with Earth Surface Features.

PART II: Platforms and Sensors: Introduction, Types and Characteristics of Sensor, Remote Sensor Platforms and Satellite Orbits, Satellite Basics and Space Imaging Satellites.

PART III: Applications of remote sensing: This part covers the usage of satellite remote sensing in various important areas, such as environmental issues, agriculture, forestry, urban issues and water management, the usage of satellite data at various resolutions, the usage of models in remote sensing, the analysis of data from various climate zones and applications in research and society.

1. Topics to be Covered

List of Topics	No. of Weeks	Contact Hours
PART I: Fundamentals & Physics of Remote Sensing Concept and Scope of Remote Sensing: Definitions, Process and Characteristics of Remote Sensing System, Advantages and limitations.	1	3
Concept of Electromagnetic Radiation (EMR): Wavelength-frequency-energy relationship of EMR, EMR Spectrum and its properties, EMR wavelength regions and their applications, Atmospheric windows, Interaction of EMR with matter, Spectral signatures.	1	3
Fundamental laws governing the science: Sources of Energy, Radiation laws: Stefan-Boltzman law, Wien's law, Kirchhoff's law etc., Black body and Real body, Radiant temperature & Kinetic temperature.	1	3
Energy Interaction in the atmosphere: Scattering, absorption, transmission, atmospheric windows	1	3
Energy Interactions with Earth Surface Features: Spectral Reflectance Curve, Concept of signatures	1	3
PART II: Platforms and Sensors Introduction: Sensor materials, Sensor System - Framing and Scanning System, Whiskbroom scanners, Push-broom scanners, Side Looking scanner.	1	6
Types and Characteristics of Sensor: Imaging and non-imaging sensors, Active and passive sensors, Resolution of Sensors - Spectral, Spatial, Radiometric & Temporal, Scale, Mapping unit, Multi-band concepts and False Colour Composites.	1	6
Remote Sensor Platforms and Satellite Orbits: Ground, Airborne and Space borne Platforms, Orbital Characteristics – Coverage, Passes, Pointing Accuracy, Geostationary, sun synchronous, shuttle orbit. Semi synchronous orbit (Molniya orbit) and Quasi-zenith satellite orbit.	2	6
Satellite Basics: Kepler's laws, Major-Semimajor axis & Eccentricity, Velocity, Period, Historical development, Launch	2	6

Vehicle, Escape Velocity Payload.		
Space Imaging Satellites: Early history of space imaging; Multispectral and Hyperspectral sensors, Radar, Lidar; Specification of some popular satellites – IRS, Landsat and SPOT series; High resolution satellites – IKONOS, Cartosat, Quickbird, OrbView, GeoEye, Pléiades, WorldView; Other latest earth resource satellites.	2	6
PART III: Applications of remote sensing This part covers the usage of satellite remote sensing in various important areas, such as environmental issues, agriculture, forestry, urban issues and water management, the usage of satellite data at various resolutions, the usage of models in remote sensing, the analysis of data from various climate zones and applications in research and society.	2	

2. Course components (total contact and credit hours per semester):

		Lecture	Tutorial	Laboratory/ Studio	Practical	Other	Total
Contact Hours	Planned	45					45
	Actual						
Credit	Planned	3					3
	Actual						

3. Individual study/learning hours expected for students per week. 3

4. Course Learning Outcomes in NQF Domains of Learning and Alignment with Assessment Methods and Teaching Strategies

On the table below are the five NQF Learning Domains, numbered in the left column.

First, insert the suitable and measurable course learning outcomes required in the appropriate learning domains (see suggestions below the table). **Second**, insert supporting teaching strategies that fit and align with the assessment methods and targeted learning outcomes. **Third**, insert appropriate assessment methods that accurately measure and evaluate the learning outcome. Each course learning outcomes, assessment method, and teaching strategy should fit in together with the rest to form an integrated learning and teaching process. (Courses are not required to include learning outcomes from each domain.)

Curriculum Map			
Code #	**NQF Learning Domains And Course Learning Outcomes**	**Course Teaching Strategies**	**Course Assessment Methods**
1.0	**Knowledge**		
1.1	To describe the main aspects of Remote Sensing and its applications.	• Lectures • Tutorials • Through group project work	• Class works. • Written examinations. • Projects. • Reports.
1.2	To recognize the concept of Electromagnetic Radiation (EMR) and applications.		
1.3	To recognize the types and characteristics of remote sensor platforms and satellite orbits.		
1.4	To describe the different systems for Space Imaging Satellites and applications.		
2.0	**Cognitive Skills**		
2.1	To explain the main aspects of Remote Sensing and its Advantages and limitations.	• Lectures • Tutorials • Through group project work	• Class works. • Written and oral examinations. • Projects. • Reports.
2.2	To explain the concept of Electromagnetic Radiation (EMR) and its Interaction with matter, Spectral signatures.		
2.3	To justify the fundamental laws governing the science such as Sources of Energy, Stefan-Boltzman law, Wien's law, Kirchhoff's law etc., Black body and Real body, Radiant temperature & Kinetic temperature.		
2.4	To summarize the satellite basics such as Kepler's laws, Major-Semimajor axis & Eccentricity, Velocity, Period, Launch Vehicle and Escape Velocity Payload.		

2.5	To evaluate the accuracies from using Space Images of some popular satellites such as IRS, Landsat, SPOT series, and High resolution satellites such as IKONOS, Cartosat, Quickbird, OrbView, GeoEye, Pléiades, WorldView and Other latest earth resource satellites.		
3.0	**Interpersonal Skills & Responsibility**		
3.1	To show and evaluate the problems and issues related to remote sensing, space imagery and its surveying applications.	• Group assignments. • Small group work.	• Class works. • Written and oral examinations. • Projects. • Reports.
3.2	To illustrate and analyze the data and information and overcoming the problems		
3.3	To act professionally and ethically in a team work.		
4.0	**Communication, Information Technology, Numerical**		
4.1	To operate effectively in civil engineering team work.	• Lectures and training tutorials • Through group project work • Through detailed research and analysis of a particular topic for remote sensing applications	• Class works. • Written and oral examinations. • Projects. • Reports.
4.2	To illustrate professional written reports, maps, and deliver professional oral and written presentations.		
4.3	To prepare our graduates to work effectively in modes ranging from independent study to multi-disciplinary teams.		
5.0	**Psychomotor**		
5.1	Not applicable	Not applicable	Not applicable

5. Schedule of Assessment Tasks for Students During the Semester			
	Assessment task (i.e., essay, test, quizzes, group project, examination, speech, oral presentation, etc.)	**Week Due**	**Proportion of Total Assessment**

1	First exam	4	15 %
2	Second exam	8	15 %
3	Third Exam	12	20 %
4	Final Exam	16 /17	50 %

D. Student Academic Counseling and Support

1. Arrangements for availability of faculty and teaching staff for individual student consultations and academic counseling. (include the time teaching staff are expected to be available per week)

The instructor helps the students in the office hours of at least 3 hours per week and after the lectures as needed.

E Learning Resources

- 1. List Required Textbooks
- Jensen, John R., 2014. Introductory Digital Image Processing: A Remote Sensing Perspective, 4th edition. Prentice Hall: Upper Saddle River, NJ 07458.
- James B. Campbell and Randolph H. Wynne, 2011. Introduction to Remote Sensing. 5th Edition. The Guilford Press, 662 pages.

2. List Essential References Materials (Journals, Reports, etc.)

- Australian Journal of Geodesy, Photogrammetry and Surveying. Institution of Surveyors, Australia, Canberra. QB301 .A87
- Geomatics Research Australasia. Institution of Surveyors, Australia, Canberra. QB301 .A87
- ITC Journal. The International Institute for Aerial Survey and Earth Sciences, Enschede. TA593 .I54
- Journal of Spatial Science. Spatial Sciences Institute Australia. Perth. G70.212 .J68

3. List Electronic Materials, Web Sites, Facebook, Twitter, etc.

- Websites of Cartography, Digital Mapping, Web Mapping.

4. Other learning material such as computer-based programs/CD, professional standards or regulations and software.

- Latest Version or Erdas Software.

F. Facilities Required

Indicate requirements for the course including size of classrooms and laboratories (i.e. number of seats in classrooms and laboratories, extent of computer access, etc.)
1. Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.) • Classrooms for lectures and exams with students working on their laptops for 20 students during the scheduled class hours. • Computer laboratory equipped with hardware and software.
2. Technology resources (AV, data show, Smart Board, software, etc.) • Computers connected to internet and equipped with required software. • Printers. • Data show for some work presentation.
3. Other resources (specify, e.g. if specific laboratory equipment is required, list requirements or attach list) **None**

G Course Evaluation and Improvement Procedures

1. Strategies for Obtaining Student's Feedback on Effectiveness of Teaching • Student questionnaire at the end of the semester. • Student test result analysis. • Regular feedback from students.
2. Other Strategies for Evaluation of Teaching by the Instructor or the Department • Regular review of the course contents by the related department committee. • Input from visiting professors.
3. Procedures for Teaching Development • Regular updating of learning resources. • Usage of new technologies in presenting the course materials. • Self-learning. • Promote reading of outside materials. • Encouraging students to conduct scientific presentations and group discussions. • Additional training for the staff assist.
4. Procedures for Verifying Standards of Student's Achievement (e.g. check marking by an independent member teaching staff of a sample of student's work, periodic exchange and remarking of tests or a sample of assignments with staff members at another institution) • Check marking by an independent member teaching staff of a sample of student work, periodic exchange and remarking of tests or a sample of assignments with staff at another institution • A review of a sample of student answers by a related department committee. • In-department group review and marking. • External reviewer for a sample of student answering sheets.
5. Describe the planning arrangements for periodically reviewing course effectiveness and planning for developing it. • Regular updating of learning resources. • Usage of new technologies in presenting the course materials. • Regular review of the course content by the related department committee. • Input from external and internal reviewers.

Name of Course Instructor: **Dr. Khalid El-Ashmawy**

Signature: _____ **Date Completed:** _____

Program Coordinator: _____

Signature: _____ **Date Received:** _____

COURSE SPECIFICATIONS

Form

Course Title: **Computer Aided Design (CAD) Applications in Surveying.**

.Course Code: **803692-3**

Date: 2018-10-19.	Institution: **Umm Al-Qura University**
College: **College of Engineering& Islamic Architecture**	Department: **Civil Engineering**

A. Course Identification and General Information

1. Course title and code: **Computer Aided Design (CAD) applications in Surveying, 803692-3**
2. Credit hours: **3**
3. Program(s) in which the course is offered. **Civil Engineering Department**

   (If general elective available in many programs indicate this rather than list programs)

   Master Program in Surveying Engineering
4. Name of faculty member responsible for the course: **Dr. Khalid El-Ashmawy**
5. Level/year at which this course is offered: **Level 3 / 2nd Year**
6. Pre-requisites for this course (if any):
7. Co-requisites for this course (if any)
8. Location if not on main campus
9. Mode of Instruction (mark all that apply)

a. Traditional classroom	✓	What percentage?	100
b. Blended (traditional and online)		What percentage?	
c. E-learning		What percentage?	
d. Correspondence		What percentage?	
e. Other		What percentage?	

Comments:

B Objectives

1. The main objective of this course

- Handle Mapping and 3D CAD applications proficiently.
- Learn about the professional software used for coordinates transformation, network and triangulation adjustment techniques and analysis
- Learn about the suitable software used for sectioning, contouring and earthwork computation.

2. Describe briefly any plans for developing and improving the course that are being implemented. (e.g. increased use of the IT or online reference material, changes in content as a result of new research in the field)

- Increasing the number of computers.
- E- learning
- Video conference
- Increased use of IT or web based reference material,
- Changes in content as a result of new research in the field

C. Course Description (Note: General description in the form used in the program's bulletin or handbook)

Course Description:

Surveying softwares for coordinates transformation, network adjustment and triangulation adjustment. Explanation the main menus and commands of Surfer and AUTOCAD Civil 3D softwares. Production of surveying maps, cadastral and topographic, Using AutoCAD . Using Surfer and AUTOCAD Civil 3D for contouring, earthwork computation, sectioning and road design.

1. Topics to be Covered

List of Topics	No. of Weeks	Contact Hours
Coordinates transformation and its applications using the available software	2	6
Network adjustment technique using the available software (e.g. LandSurMap software)	2	6
AutoCAD software Menus for Mapping	2	6
Preparation of surveying maps, Cadastral and topographic, Using AutoCAD	2	6
Using Surfer and AUTOCAD Civil 3D for contouring	2	6

Using Surfer and AUTOCAD Civil 3D for earthwork computation	1	6
Using Surfer and AUTOCAD Civil 3D for sectioning and road design	4	12
Practical part: • Using LandSurMap software for Coordinates transformation, Coordinates projections and Network adjustment techniques • Using AutoCAD for preparation of surveying maps, Cadastral and topographic. • Using Surfer and AUTOCAD Civil 3D for contouring, for earthwork computation and for sectioning and road design.	Weekly	45

2. Course components (total contact and credit hours per semester):

		Lecture	Tutorial	Laboratory/ Studio	Practical	Other	Total
Contact Hours	Planned	30			45		75
	Actual						
Credit	Planned	2			1		3
	Actual						

3. Individual study/learning hours expected for students per week. 3

4. Course Learning Outcomes in NQF Domains of Learning and Alignment with Assessment Methods and Teaching Strategies

On the table below are the five NQF Learning Domains, numbered in the left column.

First, insert the suitable and measurable course learning outcomes required in the appropriate learning domains (see suggestions below the table). **Second**, insert supporting teaching strategies that fit and align with the assessment methods and targeted learning outcomes. **Third**, insert appropriate assessment methods that accurately measure and evaluate the learning outcome. Each course learning outcomes, assessment method, and teaching strategy should fit in together with the rest to form an integrated learning and teaching process. (Courses are not required to include learning outcomes from each domain.)

Curriculum Map

Code #	NQF Learning Domains And Course Learning Outcomes	Course Teaching Strategies	Course Assessment Methods
1.0	**Knowledge**		
1.1	To inform the student about the available computer software related	• Through lectures, module notes, tutorials,	• Class works. • Written

	to surveying and observations adjustment.	coursework, examinations and group project work. • Through detailed research and analysis of a particular topic for surveying applications.	examinations. • Projects. • Reports.
1.2	To enables the student to use some of these programs in the surveying applications.		
2.0	**Cognitive Skills**		
2.1	To inform the student about the available computer software related to surveying applications and enables the student to use some of these programs in the analysis and mapping problems.	• Through lectures, module notes, tutorials, coursework, examinations and group project work. • Through detailed research and analysis of a particular topic for surveying applications.	• Class works. • Written examinations. • Projects. • Reports. • Practical Laptop Examinations
2.2	Analyze and solve surveying problems.		
2.3	Team work in project and writing reports		
3.0	**Interpersonal Skills & Responsibility**		
3.1	To increase the ability to understand problems and issues related to Surveying, Mapping and computations.	• Through lectures, module notes, tutorials, coursework, examinations and group project work. • Through detailed research and analysis of a particular topic for surveying applications	• Class works. • Written examinations. • Projects. • Reports. • Practical Laptop Examinations
3.2	To interpret the data and information and overcoming the problems		
3.3	To prepare our post graduates for further research work.		
4.0	**Communication, Information Technology, Numerical**		
4.1	To facilitate and engages in activities that systematically conduct, act upon, and report assessment of individual student educational performance and evaluation of the instructional program.	• Through lectures, module notes, tutorials, coursework, examinations and group project work. • Through detailed research and analysis of a particular topic for surveying applications	• Class works. • Written examinations. • Projects. • Reports. • Practical Laptop Examinations
4.2	To facilitate and engages in activities that in form the organizations decision-making by collecting and		

	organizing a variety of formal and informal information from multiple stakeholders.		
4.3	To prepare our graduates to work effectively in modes ranging from independent study to multi-disciplinary teams.		
5.0	**Psychomotor**		
5.1	Not applicable	Not applicable	Not applicable

5. Schedule of Assessment Tasks for Students During the Semester

	Assessment task (i.e., essay, test, quizzes, group project, examination, speech, oral presentation, etc.)	Week Due	Proportion of Total Assessment
1	First Test	4	10%
2	Second Test	8	10%
3	Third Test	12	15%
4	Final Exam (Practical)	14	15%
5	Final Exam	16 /17	50 %

D. Student Academic Counseling and Support

1. Arrangements for availability of faculty and teaching staff for individual student consultations and academic counseling. (include the time teaching staff are expected to be available per week)

- All faculty has allocated tutorial or consultation hours during which the concerned teaching staff is available to provide academic advising to students.
- Generally, five hours are allocated per week and displayed outside office of the concerned teaching staff to facilitate advising to the students.
- New lecturers attend a personalised programme of courses and, in the final year of probation, they assesses their teaching through direct observation and a portfolio.
- Professional Development works directly with staff who wishs to develop more effective teaching and learning methods - including the area of learning technologies - and provides resources to support the learning skills development of students.

E Learning Resources

1. List Required Textbooks

- Autodesk, 2016. Mastering AutoCAD Civil 3D 2016: Autodesk Official Press 1st Edition.
- John Cooke, 2016. AutoCAD Civil 3D Survey – Practical Applications, CivilTraining, LLC, a division of Wetland Studies and Solutions, Inc.
- Golden Software, 2015. Manual for Surfer 13,

2. List Essential References Materials (Journals, Reports, etc.)

• AutoCAD manual and website
3. List Electronic Materials, Web Sites, Facebook, Twitter, etc. • Websites of software companies.
4. Other learning material such as computer-based programs/CD, professional standards or regulations and software. • Latest Software and Techniques

F. Facilities Required

Indicate requirements for the course including size of classrooms and laboratories (i.e. number of seats in classrooms and laboratories, extent of computer access, etc.)
1. Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.) • Classroom to accommodate 15 students equipped with usual blackboard or smart board. • Computer laboratory equipped with hardware and software.
2. Technology resources (AV, data show, Smart Board, software, etc.) • Computers connected to internet and equipped with required software. • Printers. • Data show for some work presentation.
3. Other resources (specify, e.g. if specific laboratory equipment is required, list requirements or attach list) **None**

G Course Evaluation and Improvement Procedures

1. Strategies for Obtaining Student's Feedback on Effectiveness of Teaching • Student questionnaire at the end of the semester. • Student test result analysis. • Regular feedback from students.
2. Other Strategies for Evaluation of Teaching by the Instructor or the Department • Regular review of the course contents by the related department committee. • Input from visiting professors.
3. Procedures for Teaching Development • Regular updating of learning resources. • Usage of new technologies in presenting the course materials. • Self-learning. • Promote reading of outside materials. • Encouraging students to conduct scientific presentations and group discussions. • Additional training for the staff assist.
4. Procedures for Verifying Standards of Student's Achievement (e.g. check marking by an independent member teaching staff of a sample of student's work, periodic exchange and remarking of tests or a sample of assignments with staff members at another institution) • Check marking by an independent member teaching staff of a sample of student work, periodic exchange and remarking of tests or a sample of assignments with staff at another institution • A review of a sample of student answers by a related department committee. • In-department group review and marking. • External reviewer for a sample of student answering sheets.

5. Describe the planning arrangements for periodically reviewing course effectiveness and planning for developing it.

- Regular updating of learning resources.
- Usage of new technologies in presenting the course materials.
- Regular review of the course content by the related department committee.
- Input from external and internal reviewers.

Name of Course Instructor: **Dr. Khalid El-Ashmawy**

Signature: _____ **Date Completed:** _____

Program Coordinator: _____

Signature: _____ **Date Received:** _____

COURSE SPECIFICATIONS

Form

Course Title: **Research Project**

Course Code: **803693-6**.

Date: 2018-10-19.	Institution: **Umm Al-Qura University**
College: **College of Engineering& Islamic Architecture**	Department: **Civil Engineering**

A. Course Identification and General Information

1. Course title and code: **Research Project, 803693-6**
2. Credit hours: **3**
3. Program(s) in which the course is offered. **Civil Engineering Department** (If general elective available in many programs indicate this rather than list programs) **Master Program in Surveying Engineering**
4. Name of faculty member responsible for the course: **Dr. Khalid El-Ashmawy**
5. Level/year at which this course is offered: **Level 3 / 2nd Year and Level 4 / 2nd Year**
6. Pre-requisites for this course (if any): **Department and Supervisor Approval**
7. Co-requisites for this course (if any)
8. Location if not on main campus
9. Mode of Instruction (mark all that apply)

a. Traditional classroom		What percentage?	
b. Blended (traditional and online)		What percentage?	
c. E-learning		What percentage?	
d. Correspondence		What percentage?	
e. Other	✓	What percentage?	100

Comments:

B Objectives

1. The main objective of this course

This subject provides the capstone experience for students in Surveying Engineering. Students will combine their expertise in interdisciplinary groups or as individuals to address real-world problems, typically in contact with industry.

Project topics will be advertised well in advance of commencement of the subject so that students can make an informed choice of topic and enroll early. Students must register their topic, group and supervisor before the subject commences.

On completion of this subject the student is expected to:

1. Search, analyze and document engineering science and other literature in order to determine the need for further research in a chosen area
2. Synthesize an hypothesis to be tested
3. Devise a methodology of investigation to test the hypothesis
4. Collect and analyze a range of data (qualitative and/or quantitative) and/or undertake computer modeling and simulation to implement the methodology
5. Write project reports that follow good engineering science practice
6. Present a poster of the findings of an investigation.

2. Describe briefly any plans for developing and improving the course that are being implemented. (e.g. increased use of the IT or online reference material, changes in content as a result of new research in the field)

- Increasing the number of computers.
- E- learning
- Video conference
- Increased use of IT or web based reference material,
- Changes in content as a result of new research in the field

C. Course Description (Note: General description in the form used in the program's bulletin or handbook)

Course Description:

The research project course is taken over two consecutive semesters. The research project is dependent on methodologies requiring experiments, field work, and problems involving research on humans (for example surveys). It is also suited to methodologies involved computer simulations, analysis of pre-existing data and theoretical studies.

The first half semester addresses research training and comprises lectures and tutorials with group homework on topics such as project development, literature review, methodology development, skill development, critical thinking, project documentation, reflective writing, and scientific writing.

Students will practice these skills throughout their project topics with supervisors providing feedback on the results.

Students then continue the project within their groups and with regular progress meetings with their supervisor for the remainder of the year. The project culminates with students presenting their project and findings on a poster at a student expo, an oral presentation at a student conference, and also in written form in the style of a project report.

1. Topics to be Covered

List of Topics	No. of Weeks	Contact Hours
Provide schedule of project deliverables	1	3
Preparing Project Proposal team report	2	6
Prepare the project, field work, data processing, data analyzing and getting final results.	20	60
Prepare detailed drawings	3	9
Prepare the team oral presentation	1	3
Prepare the team poster presentation	1	3
Final team report	2	6

2. Course components (total contact and credit hours per semester):

		Lecture	Tutorial	Laboratory/ Studio	Practical	Other	Total
Contact Hours	Planned					90	90
	Actual						
Credit	Planned					6	6
	Actual						

3. Individual study/learning hours expected for students per week. 6

4. Course Learning Outcomes in NQF Domains of Learning and Alignment with Assessment Methods and Teaching Strategies

On the table below are the five NQF Learning Domains, numbered in the left column.

First, insert the suitable and measurable course learning outcomes required in the appropriate

learning domains (see suggestions below the table). **Second**, insert supporting teaching strategies that fit and align with the assessment methods and targeted learning outcomes. **Third**, insert appropriate assessment methods that accurately measure and evaluate the learning outcome. Each course learning outcomes, assessment method, and teaching strategy should fit in together with the rest to form an integrated learning and teaching process. (Courses are not required to include learning outcomes from each domain.)

Curriculum Map

Code #	NQF Learning Domains And Course Learning Outcomes	Course Teaching Strategies	Course Assessment Methods
1.0	**Knowledge**		
1.1	To understand the main aims of the project and the methods for achieving them.	• Lectures	Term Project
1.2	To describe Project Proposal team report, outlining the context, literature review and methodology.		
1.3	To recognize the codes, specifications and local laws regulating various aspects of the project and follow them wherever possible.		
2.0	**Cognitive Skills**		
2.1	To identify, formulate and solve the practical, analytical and numerical problems associated with the project	• Lectures	• Written and oral examinations. • Term Projects. • Reports.
2.2	To design a system, component or process with defined constraints of the project		
2.3	To plan, design and conduct the field work and processing required for the project and to analyze and interpret the data		
2.4	To describe the economic and environmental impact and contemporary issues of the project and various alternative solutions		
2.5	To summarize the merits and demerits of the research project.		

3.0	**Interpersonal Skills & Responsibility**		
3.1	To function as a member of a multi-disciplinary team	N/A	N/A
3.2	To identify and analyze a situation involving professional ethics and to make a decision		
4.0	**Communication, Information Technology, Numerical**		
4.1	To operate effectively in civil engineering team work.	N/A	N/A
4.2	To illustrate professional written reports, maps, and deliver professional oral and written presentations.		
4.3	To prepare our graduates to work effectively in modes ranging from independent study to multi-disciplinary teams.		
5.0	**Psychomotor**		
5.1	To conduct the field works or numerical processing, or draw the necessary maps required for the project.	N/A	N/A

5. Schedule of Assessment Tasks for Students During the Semester

	Assessment task (i.e., essay, test, quizzes, group project, examination, speech, oral presentation, etc.)	Week Due	Proportion of Total Assessment
1	Project Proposal team report	3	10 %
2	A weekly factual record of project progress	1 to 29	20 %
3	Presentation of a team oral presentation	29	10 %
4	Presentation of conference style team poster	29	10 %
5	Final team report	30	25 %
6	Evaluation from the jury	30	25%

D. Student Academic Counseling and Support

1. Arrangements for availability of faculty and teaching staff for individual student consultations and academic counseling. (include the time teaching staff are expected to be available per week) • All faculty has allocated tutorial or consultation hours during which the concerned teaching staff is available to provide academic advising to students. • Generally, five hours are allocated per week and displayed outside office of the concerned teaching staff to facilitate advising to the students. • New lecturers attend a personalised programme of courses and, in the final year of probation, they assesses their teaching through direct observation and a portfolio. • Professional Development works directly with staff who wishs to develop more effective teaching and learning methods - including the area of learning technologies - and provides resources to support the learning skills development of students.

E Learning Resources

1. List Required Textbooks As specified by the Main Project Advisor according to the nature of the project
2. List Essential References Materials (Journals, Reports, etc.) As specified by the Main Project Advisor according to the nature of the project
3. List Electronic Materials, Web Sites, Facebook, Twitter, etc. As specified by the Main Project Advisor according to the nature of the project
4. Other learning material such as computer-based programs/CD, professional standards or regulations and software. As specified by the Main Project Advisor according to the nature of the project

F. Facilities Required

Indicate requirements for the course including size of classrooms and laboratories (i.e. number of seats in classrooms and laboratories, extent of computer access, etc.)
1. Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.) • Classroom to accommodate 15 students equipped with usual blackboard or smart board. • Laboratory and equipment as required by the nature of the project • Computer laboratory equipped with hardware and software.
2. Technology resources (AV, data show, Smart Board, software, etc.) • Computers connected to internet and equipped with required software. • Printers. • Data show for some work presentation.
3. Other resources (specify, e.g. if specific laboratory equipment is required, list requirements or attach list) **None**

G Course Evaluation and Improvement Procedures

1. Strategies for Obtaining Student's Feedback on Effectiveness of Teaching • Student questionnaire at the end of the semester. • Student test result analysis. • Regular feedback from students.
2. Other Strategies for Evaluation of Teaching by the Instructor or the Department • Regular review of the course contents by the related department committee. • Input from visiting professors.
3. Procedures for Teaching Development • Regular updating of learning resources. • Usage of new technologies in presenting the course materials. • Self-learning. • Promote reading of outside materials. • The students work samples and their scores in each course learning outcome and the cognitive abilities are analyzed and improvements are suggested for teaching the course next time. • Encouraging students to conduct scientific presentations and group discussions. • Additional training for the staff assist.
4. Procedures for Verifying Standards of Student's Achievement (e.g. check marking by an independent member teaching staff of a sample of student's work, periodic exchange and remarking of tests or a sample of assignments with staff members at another institution) • Check marking by an independent member teaching staff of a sample of student work, periodic exchange and remarking of tests or a sample of assignments with staff at another institution • A review of a sample of student answers by a related department committee. • In-department group review and marking. • External reviewer for a sample of student answering sheets.
5. Describe the planning arrangements for periodically reviewing course effectiveness and planning for developing it. • Regular updating of learning resources. • Usage of new technologies in presenting the course materials. • Regular review of the course content by the related department committee. • Input from external and internal reviewers.

Name of Course Instructor: **Dr. Khalid El-Ashmawy**

Signature: _____ **Date Completed:** _____

Program Coordinator: _____

Signature: _____ **Date Received:** _____

COURSE SPECIFICATIONS

Form

Course Title: **Cartography and Digital Mapping**

Course Code: **803694-3**.

Date: 2018-10-19.	**Institution**: **Umm Al-Qura University**
College: **College of Engineering& Islamic Architecture**	**Department**: **Civil Engineering**

A. Course Identification and General Information

1. Course title and code: **Cartography and Digital Mapping, 803694-3**
2. Credit hours: **3**
3. Program(s) in which the course is offered. Civil Engineering Department (If general elective available in many programs indicate this rather than list programs) **Master Program in Surveying Engineering**
4. Name of faculty member responsible for the course: **Dr. Khalid El-Ashmawy**
5. Level/year at which this course is offered: **Level 4 / 2nd Year**
6. Pre-requisites for this course (if any):
7. Co-requisites for this course (if any)
8. Location if not on main campus
9. Mode of Instruction (mark all that apply)

f. Traditional classroom	✓	What percentage?	100
g. Blended (traditional and online)		What percentage?	
h. E-learning		What percentage?	
i. Correspondence		What percentage?	
j. Other		What percentage?	

Comments:

B Objectives

1. The main objective of this course

This course covers theoretical concepts and practical aspects for the basic principles of cartography and digital surveying and mapping of earth surface.

The course objective is to provide students with:

- An overview of cartography (history, current status, definitions)
- Basic mapping principles (scale, projections, spatial reference systems)
- Elements of map design and layout (map types, lettering)
- Digital surveying and mapping using total station, GPS and mapping software
- Basics of point doud visualization of LIDAR data sets
- Procedures to utilize digital mapping resources on the Internet, such as Google Maps APIs, Google Earth, and concepts used in Web mapping,
- Methods of assessing the quality of spatial data published on the Web.

2. Describe briefly any plans for developing and improving the course that are being implemented. (e.g. increased use of the IT or online reference material, changes in content as a result of new research in the field)

- Increasing the number of computers.
- E- learning
- Video conference
- Increased use of IT or web based reference material,
- Changes in content as a result of new research in the field

C. Course Description (Note: General description in the form used in the program's bulletin or handbook)

Course Description:

An overview of cartography: history, current status, definitions. Basic mapping principles: scale, projections, spatial reference systems. Elements of map design and layout: map types, lettering. Digital surveying and mapping of earth surface: using total station, using GPS, using mapping software. Basics of point cloud visualization of LIDAR data sets. Procedures to utilize digital mapping resources on the Internet: Google Maps APIs, Google Earth, concepts used in Web mapping. Methods of assessing the quality of spatial data published on the Web.

1. Topics to be Covered

List of Topics	No. of Weeks	Contact Hours
An overview of cartography (history, current status, definitions)	1	3
Basic mapping principles (scale, projections, spatial reference systems)	1	3
2D coordinate transformations	1	3
Elements of map design and layout (map types, lettering)	1	3
Digital surveying and mapping of earth surface: using total station	2	3
Digital surveying and mapping of earth surface: using GPS	2	3
Digital surveying and mapping of earth surface: using mapping software.	2	3
Principles of LIDAR (Light Detection and Ranging)	2	3
Web mapping, ArcGIS Online, Google Maps API	1	3
Web 2.0 geo-data sources	1	3
Methods of assessing the quality of spatial data published on the Web	1	3

2. Course components (total contact and credit hours per semester):

		Lecture	Tutorial	Laboratory/ Studio	Practical	Other	Total
Contact Hours	Planned	45					45
	Actual						
Credit	Planned	3					3
	Actual						

3. Individual study/learning hours expected for students per week. 3

4. Course Learning Outcomes in NQF Domains of Learning and Alignment with Assessment Methods and Teaching Strategies

On the table below are the five NQF Learning Domains, numbered in the left column.

First, insert the suitable and measurable course learning outcomes required in the appropriate

learning domains (see suggestions below the table). **Second**, insert supporting teaching strategies that fit and align with the assessment methods and targeted learning outcomes. **Third**, insert appropriate assessment methods that accurately measure and evaluate the learning outcome. Each course learning outcomes, assessment method, and teaching strategy should fit in together with the rest to form an integrated learning and teaching process. (Courses are not required to include learning outcomes from each domain.)

Curriculum Map

Code #	NQF Learning Domains And Course Learning Outcomes	Course Teaching Strategies	Course Assessment Methods
1.0	**Knowledge**		
1.1	To describe the main aspects of cartography and digital mapping.	• Lectures and training tutorials	• class works, Written and oral examinations
1.2	To recognize the principles of map scale, projections, spatial reference systems and coordinates transformation.		
1.3	To recognize methods of digital surveying and mapping of earth surface.		
1.4	To describe the principles of LIDAR Web mapping methods.		
2.0	**Cognitive Skills**		
2.1	To explain the main aspects of cartography and digital mapping.	• Lectures and training tutorials • Through group project work	• Class works. • Written and oral examinations. • Projects. • Reports.
2.2	To explain map scale, map projections, spatial reference systems and methods of coordinates transformation.		
2.3	To calculate the parameters of interior and exterior orientations of photographs.		
2.4	To explain the different methods of digital surveying and mapping of earth surface such as total station, GPS and LIDAR.		

2.5	To summarize Web mapping methods and to estimate the quality of spatial data.		
3.0	**Interpersonal Skills & Responsibility**		
3.1	To show and evaluate the problems and issues related to Cartography, Digital mapping, Surveying and Web mapping methods.	• Group assignments. • Small group work.	• Class works. • Written and oral examinations. • Projects. • Reports.
3.2	To illustrate and analyze the data and information and overcoming the problems		
3.3	To act professionally and ethically in a team work.		
4.0	**Communication, Information Technology, Numerical**		
4.1	To operate effectively in civil engineering team work.	• Lectures and training tutorials • Through group project work • Through detailed research and analysis of a particular topic for digital mapping applications	• Class works. • Written and oral examinations. • Projects. • Reports.
4.2	To illustrate professional written reports, maps, and deliver professional oral and written presentations.		
4.3	To prepare our graduates to work effectively in modes ranging from independent study to multi-disciplinary teams.		
5.0	**Psychomotor**		
5.1	Not applicable	Not applicable	Not applicable

5. Schedule of Assessment Tasks for Students During the Semester

	Assessment task (i.e., essay, test, quizzes, group project, examination, speech, oral presentation, etc.)	Week Due	Proportion of Total Assessment
1	First exam	4	15 %
2	Second exam	8	15 %
3	Third Exam	12	20 %

4	Final Exam	16 /17	50 %

D. Student Academic Counseling and Support

1. Arrangements for availability of faculty and teaching staff for individual student consultations and academic counseling. (include the time teaching staff are expected to be available per week)

- All faculty has allocated tutorial or consultation hours during which the concerned teaching staff is available to provide academic advising to students.
- Generally, five hours are allocated per week and displayed outside office of the concerned teaching staff to facilitate advising to the students.
- New lecturers attend a personalised programme of courses and, in the final year of probation, they assesses their teaching through direct observation and a portfolio.
- Professional Development works directly with staff who wishs to develop more effective teaching and learning methods - including the area of learning technologies - and provides resources to support the learning skills development of students.

E Learning Resources

1. List Required Textbooks

- Kimerling, Aileen R. Buckley, Phillip C. Muehrcke, and Juliana O. Muehrcke, 2012. Map Use: Reading, Analysis and Interpretation. 6th ed., Esri, USA.
- Kraak, Menno-Jan, and Ormeling, Ferjan 2013. Cartography: Visualization of Spatial Data. 3rd edition. Routledge, New York, USA.
- MacEachren, Alan, 2010. How Maps Work: Representation, Visualization, and Design. 2nd edition. NY: The Guilford Press, 513 pages.
- Peterson, G. N., 2009. GIS Cartography: A Guide to Effective Map Design. Taylor & Francis Group, LLC.
- Mitchell, T. 2005. Web Mapping Illustrated. O'Reilly Media, Inc., USA.

2. List Essential References Materials (Journals, Reports, etc.)

- Australian Journal of Geodesy, Photogrammetry and Surveying. Institution of Surveyors, Australia, Canberra. QB301 .A87
- Geomatics Research Australasia. Institution of Surveyors, Australia, Canberra. QB301 .A87
- ITC Journal. The International Institute for Aerial Survey and Earth Sciences, Enschede. TA593 .I54
- Journal of Spatial Science. Spatial Sciences Institute Australia. Perth. G70.212 .J68

3. List Electronic Materials, Web Sites, Facebook, Twitter, etc.

- Websites of Cartography, Digital Mapping, Web Mapping.

4. Other learning material such as computer-based programs/CD, professional standards or regulations and software.

- Latest Software and Techniques for Cartography and Digital Mapping.

F. Facilities Required

Indicate requirements for the course including size of classrooms and laboratories (i.e. number of seats in classrooms and laboratories, extent of computer access, etc.)
1. Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.) • Classroom to accommodate 15 students equipped with usual blackboard or smart board. • Computer laboratory equipped with hardware and software.
2. Technology resources (AV, data show, Smart Board, software, etc.) • Computers connected to internet and equipped with required software. • Printers. • Data show for some work presentation.
3. Other resources (specify, e.g. if specific laboratory equipment is required, list requirements or attach list) **None**

G Course Evaluation and Improvement Procedures

1. Strategies for Obtaining Student's Feedback on Effectiveness of Teaching • Student questionnaire at the end of the semester. • Student test result analysis. • Regular feedback from students.
2. Other Strategies for Evaluation of Teaching by the Instructor or the Department • Regular review of the course contents by the related department committee. • Input from visiting professors.
3. Procedures for Teaching Development • Regular updating of learning resources. • Usage of new technologies in presenting the course materials. • Self-learning. • Promote reading of outside materials. • Encouraging students to conduct scientific presentations and group discussions. • Additional training for the staff assist.
4. Procedures for Verifying Standards of Student's Achievement (e.g. check marking by an independent member teaching staff of a sample of student's work, periodic exchange and remarking of tests or a sample of assignments with staff members at another institution) • Check marking by an independent member teaching staff of a sample of student work, periodic exchange and remarking of tests or a sample of assignments with staff at another institution • A review of a sample of student answers by a related department committee. • In-department group review and marking. • External reviewer for a sample of student answering sheets.
5. Describe the planning arrangements for periodically reviewing course effectiveness and planning for developing it. • Regular updating of learning resources. • Usage of new technologies in presenting the course materials. • Regular review of the course content by the related department committee. • Input from external and internal reviewers.

Name of Course Instructor: **Dr. Khalid El-Ashmawy**

Signature: _____ **Date Completed:** _____

Program Coordinator: _____

Signature: _____ **Date Received:** _____

COURSE SPECIFICATIONS

Form

Course Title: **Deformation Monitoring**

Course Code: **803695-3**.

Date: 2018-10-19.	Institution: **Umm Al-Qura University**
College: **College of Engineering& Islamic Architecture**	Department: **Civil Engineering**

A. Course Identification and General Information

1. Course title and code: **Deformation Monitoring, 803695-3**
2. Credit hours: **3**
3. Program(s) in which the course is offered. Civil Engineering Department (If general elective available in many programs indicate this rather than list programs) **Master Program in Surveying Engineering**
4. Name of faculty member responsible for the course: **Dr. Khalid El-Ashmawy**
5. Level/year at which this course is offered: **Level 4 / 2nd Year**
6. Pre-requisites for this course (if any):
7. Co-requisites for this course (if any)
8. Location if not on main campus
9. Mode of Instruction (mark all that apply)

a. Traditional classroom	✓	What percentage?	100
b. Blended (traditional and online)		What percentage?	
c. E-learning		What percentage?	
d. Correspondence		What percentage?	
e. Other		What percentage?	

Comments:

B Objectives

1. The main objective of this course

- To broaden and deepen the knowledge of deformation monitoring surveys, including a broad range of survey instrumentation and analysis techniques relevant to engineering and industry.
- To cover several topics and methods that are specialist skills of a consultant surveyor, not common place skills.
- To compare between the different methods of deformation determination and monitoring.

2. Describe briefly any plans for developing and improving the course that are being implemented. (e.g. increased use of the IT or online reference material, changes in content as a result of new research in the field)

- Increasing the number of computers.
- E- learning
- Video conference
- Increased use of IT or web based reference material,
- Changes in content as a result of new research in the field

C. Course Description (Note: General description in the form used in the program's bulletin or handbook)

Course Description:

This course introduces the concepts, principles and techniques used for deformation monitoring of structures. Topics include: Principles and concepts of deformation monitoring by surveying techniques. Planning, Design, and Accuracy Requirements. Deformation Measurement and Alignment Instrumentation. Sources of Measurement Error and Instrument Calibrations. Settlement Surveys Alignment, Deflection, and Crack Measurement Surveys. Monitoring Structural Deformations Using the Global Positioning System. Laser Scanning in Deformation Monitoring. High precision (sub-mm) survey techniques. 3D theodolite intersection measuring systems. Close Range Photogrammetry, for monitoring scale models, building facades and heritage structures.

1. Topics to be Covered

List of Topics	No. of Weeks	Contact Hours
Introduction: Concepts, Principles, Techniques used for deformation monitoring of structures.	1	3
Principles and concepts of deformation monitoring by surveying techniques.	1	3
Planning, Design, and Accuracy Requirements	1	3
Deformation Measurement and Alignment Instrumentation	1	3
Sources of Measurement Error and Instrument Calibrations	1	3
Settlement Surveys Alignment, Deflection, and Crack Measurement Surveys.	2	6
Monitoring Structural Deformations Using the Global Positioning System	2	6
Laser Scanning in Deformation Monitoring	1	3
High precision (sub-mm) survey techniques. 3D theodolite intersection measuring systems.	2	6
Precise Differential Leveling Observations	1	3
Close Range Photogrammetry, for monitoring scale models, building facades and heritage structures.	2	6
Practical part: Monitoring Structural Deformations Using: • Precise Leveling. • 3D theodolite intersection measuring systems • Global Positioning System. • Laser Scanning	Weekly	45

2. Course components (total contact and credit hours per semester):

		Lecture	Tutorial	Laboratory/ Studio	Practical	Other	Total
Contact Hours	Planned	30			45		75
	Actual						
Credit	Planned	2			1		3
	Actual						

3. Individual study/learning hours expected for students per week.	3

4. Course Learning Outcomes in NQF Domains of Learning and Alignment with Assessment Methods and Teaching Strategies

On the table below are the five NQF Learning Domains, numbered in the left column.

First, insert the suitable and measurable course learning outcomes required in the appropriate learning domains (see suggestions below the table). **Second**, insert supporting teaching strategies that fit and align with the assessment methods and targeted learning outcomes. **Third**, insert appropriate assessment methods that accurately measure and evaluate the learning outcome. Each course learning outcomes, assessment method, and teaching strategy should fit in together with the rest to form an integrated learning and teaching process. (Courses are not required to include learning outcomes from each domain.)

Curriculum Map

Code #	NQF Learning Domains And Course Learning Outcomes	Course Teaching Strategies	Course Assessment Methods
1.0	**Knowledge**		
1.1	To describe the main aspects of deformation determination methods.	• Lectures and training tutorials • Through group project work	• Class works. • Written and oral examinations. • Projects. • Reports.
1.2	To recognize the principles of Deformation Measurement, Settlement Surveys and using Global Positioning System, Laser Scanning and Close Range Photogrammetry in Deformation Monitoring.		
1.3	To recognize 3D theodolite intersection measuring systems.		
1.4	To describe the advantages and disadvantages of each method of deformation monitoring.		
2.0	**Cognitive Skills**		
2.1	To explain the main Concepts, Principles, Techniques used for deformation monitoring of structures.	• Lectures and training tutorials • Through group project work	• Class works. • Written and oral examinations. • Projects.

2.2	To explain the use of global positioning system, laser scanning and close range photogrammetry for deformation monitoring.		• Reports.
2.3	To justify high precision survey techniques such as 3D theodolite intersection measuring systems and precise differential leveling observations for monitoring of deformation.		
2.4	To compare between the different methods of deformation determination.		
3.0	**Interpersonal Skills & Responsibility**		
3.1	To show and evaluate the methods of deformation determination and monitoring.	• Group assignments. • Small group work.	• Class works. • Written and oral examinations. • Projects. • Reports.
3.2	To illustrate and analyze the data and information and overcoming the problems		
3.3	To act professionally and ethically in a team work.		
4.0	**Communication, Information Technology, Numerical**		
4.1	To operate effectively in civil engineering team work.	• Lectures and training tutorials • Through group project work • Through detailed research and analysis of a particular topic for deformation monitoring.	• Class works. • Written and oral examinations. • Projects. • Reports.
4.2	To illustrate professional written reports, maps, and deliver professional oral and written presentations.		
4.3	To prepare our graduates to work effectively in modes ranging from independent study to multi-disciplinary teams.		
5.0	**Psychomotor**		

5.1	Not applicable	Not applicable	Not applicable

5. Schedule of Assessment Tasks for Students During the Semester			
	Assessment task (i.e., essay, test, quizzes, group project, examination, speech, oral presentation, etc.)	Week Due	Proportion of Total Assessment
1	First exam	4	10 %
2	Second exam	8	10 %
3	Third Exam	12	15 %
4	Final Exam (Practical)	14	15 %
5	Final Exam	16 /17	50 %

D. Student Academic Counseling and Support

1. Arrangements for availability of faculty and teaching staff for individual student consultations and academic counseling. (include the time teaching staff are expected to be available per week)

- All faculty has allocated tutorial or consultation hours during which the concerned teaching staff is available to provide academic advising to students.
- Generally, five hours are allocated per week and displayed outside office of the concerned teaching staff to facilitate advising to the students.
- New lecturers attend a personalised programme of courses and, in the final year of probation, they assesses their teaching through direct observation and a portfolio.
- Professional Development works directly with staff who wishs to develop more effective teaching and learning methods - including the area of learning technologies - and provides resources to support the learning skills development of students.

E Learning Resources

1. List Required Textbooks

- Anonym, 2002. Structural Deformation Surveying (EM 1110-2-1009), US Army Corps of Engineers, Washington, DC
- Ogundare , J. O., 2016.Precision Surveying: The Principles and Geomatics Practice. John Wiley & Sons, Inc.

2. List Essential References Materials (Journals, Reports, etc.)

- Australian Journal of Geodesy, Photogrammetry and Surveying. Institution of Surveyors, Australia, Canberra. QB301 .A87
- Geomatics Research Australasia. Institution of Surveyors, Australia, Canberra. QB301 .A87
- ITC Journal. The International Institute for Aerial Survey and Earth Sciences, Enschede. TA593 .I54
- ISPRS Journal of Photogrammetry and Remote Sensing. Elsevier, Amsterdam. TA593 .P52
- Journal of Spatial Science. Spatial Sciences Institute Australia. Perth. G70.212 .J68
- Photogrammetric Record. Photogrammetric Society, London. TR693 .P46
- Photogrammetric Engineering and Remote Sensing. American Society of Photogrammetry,

Falls Church. TA593 .P54
3. List Electronic Materials, Web Sites, Facebook, Twitter, etc. • Websites of Deformation Monitoring.
4. Other learning material such as computer-based programs/CD, professional standards or regulations and software. • Latest Software and Techniques for Surveying Applications.

F. Facilities Required

Indicate requirements for the course including size of classrooms and laboratories (i.e. number of seats in classrooms and laboratories, extent of computer access, etc.)
1. Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.) • Classroom to accommodate 15 students equipped with usual blackboard or smart board. • Computer laboratory equipped with hardware and software.
2. Technology resources (AV, data show, Smart Board, software, etc.) • Computers connected to internet and equipped with required software. • Printers. • Data show for some work presentation.
3. Other resources (specify, e.g. if specific laboratory equipment is required, list requirements or attach list) **None**

G Course Evaluation and Improvement Procedures

1. Strategies for Obtaining Student's Feedback on Effectiveness of Teaching • Student questionnaire at the end of the semester. • Student test result analysis. • Regular feedback from students.
2. Other Strategies for Evaluation of Teaching by the Instructor or the Department • Regular review of the course contents by the related department committee. • Input from visiting professors.
3. Procedures for Teaching Development • Regular updating of learning resources. • Usage of new technologies in presenting the course materials. • Self-learning. • Promote reading of outside materials. • Encouraging students to conduct scientific presentations and group discussions. • Additional training for the staff assist.
4. Procedures for Verifying Standards of Student's Achievement (e.g. check marking by an independent member teaching staff of a sample of student's work, periodic exchange and remarking of tests or a sample of assignments with staff members at another institution) • Check marking by an independent member teaching staff of a sample of student work, periodic exchange and remarking of tests or a sample of assignments with staff at another institution • A review of a sample of student answers by a related department committee. • In-department group review and marking. • External reviewer for a sample of student answering sheets.
5. Describe the planning arrangements for periodically reviewing course effectiveness and

planning for developing it.

- Regular updating of learning resources.
- Usage of new technologies in presenting the course materials.
- Regular review of the course content by the related department committee.
- Input from external and internal reviewers.

Name of Course Instructor: **Dr. Khalid El-Ashmawy**

Signature: _____ **Date Completed:** _____

Program Coordinator: _____

Signature: _____ **Date Received:** _____

COURSE SPECIFICATIONS

Form

Course Title: **Special Topics**

Course Code: **803696-3**.

Date: 2018-10-19.	Institution: **Umm Al-Qura University**
College: **College of Engineering& Islamic Architecture**	Department: **Civil Engineering**

A. Course Identification and General Information

1. Course title and code: **Special Topics, 803696-3**
2. Credit hours: **3**
3. Program(s) in which the course is offered. Civil Engineering Department (If general elective available in many programs indicate this rather than list programs) **Master Program in Surveying Engineering**
4. Name of faculty member responsible for the course: **Dr. Khalid El-Ashmawy**
5. Level/year at which this course is offered: **Elective Course**
6. Pre-requisites for this course (if any): **Supervisor Approval**
7. Co-requisites for this course (if any)
8. Location if not on main campus
9. Mode of Instruction (mark all that apply)

f.	Traditional classroom	✓	What percentage?	100
g.	Blended (traditional and online)		What percentage?	
h.	E-learning		What percentage?	
i.	Correspondence		What percentage?	
j.	Other		What percentage?	

Comments:

B Objectives

1. The main objective of this course

To give the Master Program student the opportunity to attend one of the special surveying engineering topics that he might encounter during his studying. The topic should must take into consideration the student's background, interests and the requirements for his research project.

2. Describe briefly any plans for developing and improving the course that are being implemented. (e.g. increased use of the IT or online reference material, changes in content as a result of new research in the field)

- Increasing the number of computers.
- E- learning
- Video conference
- Increased use of IT or web based reference material,
- Changes in content as a result of new research in the field

C. Course Description (Note: General description in the form used in the program's bulletin or handbook)

Course Description:

Advanced selected topics in surveying engineering in accordance with the needs of the student and the guidance of the supervisor.

1. Topics to be Covered

List of Topics	No. of Weeks	Contact Hours
To be specified by the supervisor and depends on the subject of the topic.		

2. Course components (total contact and credit hours per semester):							
		Lecture	Tutorial	Laboratory/ Studio	Practical	Other	Total
Contact Hours	Planned	45					45
	Actual						
Credit	Planned	3					3
	Actual						

3. Individual study/learning hours expected for students per week.	3

4. Course Learning Outcomes in NQF Domains of Learning and Alignment with Assessment Methods and Teaching Strategies

On the table below are the five NQF Learning Domains, numbered in the left column.

First, insert the suitable and measurable course learning outcomes required in the appropriate learning domains (see suggestions below the table). **Second**, insert supporting teaching strategies that fit and align with the assessment methods and targeted learning outcomes. **Third**, insert appropriate assessment methods that accurately measure and evaluate the learning outcome. Each course learning outcomes, assessment method, and teaching strategy should fit in together with the rest to form an integrated learning and teaching process. (Courses are not required to include learning outcomes from each domain.)

Curriculum Map

Code #	NQF Learning Domains And Course Learning Outcomes	Course Teaching Strategies	Course Assessment Methods
1.0	**Knowledge**		
It depends on the subject of the topic to be selected by the supervisor and it should follow the program Learning Outcomes, Teaching Strategies and Assessment Methods			
2.0	**Cognitive Skills**		
It depends on the subject of the topic to be selected by the supervisor and it should follow the program Learning Outcomes, Teaching Strategies and Assessment Methods			
3.0	**Interpersonal Skills & Responsibility**		
It depends on the subject of the topic to be selected by the supervisor and it should follow the program Learning Outcomes, Teaching Strategies and Assessment Methods			
4.0	**Communication, Information Technology, Numerical**		

It depends on the subject of the topic to be selected by the supervisor and it should follow the program Learning Outcomes, Teaching Strategies and Assessment Methods
5.0 **Psychomotor**
It depends on the subject of the topic to be selected by the supervisor and it should follow the program Learning Outcomes, Teaching Strategies and Assessment Methods

5. Schedule of Assessment Tasks for Students During the Semester			
	Assessment task (i.e., essay, test, quizzes, group project, examination, speech, oral presentation, etc.)	**Week Due**	**Proportion of Total Assessment**
	To be specified by the supervisor and depends on the subject of the topic.		

D. Student Academic Counseling and Support

1. Arrangements for availability of faculty and teaching staff for individual student consultations and academic counseling. (include the time teaching staff are expected to be available per week)

- All faculty has allocated tutorial or consultation hours during which the concerned teaching staff is available to provide academic advising to students.
- Generally, five hours are allocated per week and displayed outside office of the concerned teaching staff to facilitate advising to the students.
- New lecturers attend a personalised programme of courses and, in the final year of probation, they assesses their teaching through direct observation and a portfolio.
- Professional Development works directly with staff who wishs to develop more effective teaching and learning methods - including the area of learning technologies - and provides resources to support the learning skills development of students.

E Learning Resources

1. List Required Textbooks

To be specified by the supervisor and depends on the subject of the topic.

2. List Essential References Materials (Journals, Reports, etc.)

To be specified by the supervisor and depends on the subject of the topic.
3. List Electronic Materials, Web Sites, Facebook, Twitter, etc. To be specified by the supervisor and depends on the subject of the topic.
4. Other learning material such as computer-based programs/CD, professional standards or regulations and software. To be specified by the supervisor and depends on the subject of the topic.

F. Facilities Required

Indicate requirements for the course including size of classrooms and laboratories (i.e. number of seats in classrooms and laboratories, extent of computer access, etc.)
1. Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.) • Classroom to accommodate 15 students equipped with usual blackboard or smart board. • Computer laboratory equipped with hardware and software.
2. Technology resources (AV, data show, Smart Board, software, etc.) • Computers connected to internet and equipped with required software. • Printers. • Data show for some work presentation.
3. Other resources (specify, e.g. if specific laboratory equipment is required, list requirements or attach list) **None**

G Course Evaluation and Improvement Procedures

1. Strategies for Obtaining Student's Feedback on Effectiveness of Teaching • Student questionnaire at the end of the semester. • Student test result analysis. • Regular feedback from students.
2. Other Strategies for Evaluation of Teaching by the Instructor or the Department • Regular review of the course contents by the related department committee. • Input from visiting professors.
3. Procedures for Teaching Development • Regular updating of learning resources. • Usage of new technologies in presenting the course materials. • Self-learning. • Promote reading of outside materials.

- Encouraging students to conduct scientific presentations and group discussions.
- Additional training for the staff assist.

4. Procedures for Verifying Standards of Student's Achievement (e.g. check marking by an independent member teaching staff of a sample of student's work, periodic exchange and remarking of tests or a sample of assignments with staff members at another institution)

- Check marking by an independent member teaching staff of a sample of student work, periodic exchange and remarking of tests or a sample of assignments with staff at another institution
- A review of a sample of student answers by a related department committee.
- In-department group review and marking.
- External reviewer for a sample of student answering sheets.

5. Describe the planning arrangements for periodically reviewing course effectiveness and planning for developing it.

- Regular updating of learning resources.
- Usage of new technologies in presenting the course materials.
- Regular review of the course content by the related department committee.
- Input from external and internal reviewers.

Name of Course Instructor: **Dr. Khalid El-Ashmawy**

Signature: _____ **Date Completed:** _____

Program Coordinator: _____

Signature: _____ **Date Received:** _____

COURSE SPECIFICATIONS

Form

Course Title: **Laser Scanning**

Course Code: **803697-3**.

Date: 2018-10-19.	Institution: **Umm Al-Qura University**
College: **College of Engineering& Islamic Architecture**	Department: **Civil Engineering**

A. Course Identification and General Information

1. Course title and code: **Laser Scanning, 803697-3**
2. Credit hours: **3**
3. Program(s) in which the course is offered. Civil Engineering Department

   (If general elective available in many programs indicate this rather than list programs)

   Master Program in Surveying Engineering
4. Name of faculty member responsible for the course: **Dr. Khalid El-Ashmawy**
5. Level/year at which this course is offered: **Elective Course**
6. Pre-requisites for this course (if any):
7. Co-requisites for this course (if any)
8. Location if not on main campus
9. Mode of Instruction (mark all that apply)

a. Traditional classroom	✓	What percentage?	100
b. Blended (traditional and online)		What percentage?	
c. E-learning		What percentage?	
d. Correspondence		What percentage?	
e. Other		What percentage?	

Comments:

B Objectives

1. The main objective of this course

To give students theoretical and practical knowledge about the laser scanning measurement procedure, data processing and modeling. By the end of the course the students will be able to:

- Understand principle of terrestrial and airborne laser scanning
- Know how and where to use the laser scanning technology
- Plan and perform a terrestrial laser scanning project
- Register point clouds taken from different stations
- Georeference, segment and classify the point clouds
- Fit geometrical primitives to point cloud
- Create digital terrain model from LS data
- Map the images (textures) onto point cloud
- Know the different applications of laser scanning.
- Understand Mobile Mapping and its applications

2. Describe briefly any plans for developing and improving the course that are being implemented. (e.g. increased use of the IT or online reference material, changes in content as a result of new research in the field)

- Increasing the number of computers.
- E- learning
- Video conference
- Increased use of IT or web based reference material,
- Changes in content as a result of new research in the field

C. Course Description (Note: General description in the form used in the program's bulletin or handbook)

Course Description:

An overview of Laser Scanning Technology, Visualization and Structuring of Point Clouds, Registration and Calibration, Extraction of Digital Terrain Models, Building Extraction, Engineering Applications, Cultural Heritage Applications, Mobile Mapping.

1. Topics to be Covered

List of Topics	No. of Weeks	Contact Hours
Laser Scanning Technology: Basic measurement principles of laser scanners, Components of laser scanners, Basics of airborne laser scanning, Operational aspects of airborne laser scanning, Airborne lidar bathymetry	1	3
Visualisation and Structuring of Point Clouds: Visualisation, Data structures, Point cloud segmentation, Data compression	2	6
Registration and Calibration: Geometric models, Systematic error sources and models, Registration, System calibration	2	6
Extraction of Digital Terrain Models: Filtering of point clouds, Structure line determination, Digital terrain model generation	2	6
Building Extraction: Building detection, Outlining of footprints, Building reconstruction, Issues in building reconstruction, Data exchange and file formats for building models	2	6
Engineering Applications: Reconstruction of industrial sites, Structural monitoring and change detection, Corridor mapping, Conclusions	2	6
Cultural Heritage Applications: Accurate site recording: 3D reconstruction of the treasury (Al-Kasneh) in Petra, Jordan, Archaeological site: scanning the pyramids at Giza, Egypt, Archaeological airborne laser scanning in forested areas, Archaeological site: 3D documentation of an archaeological excavation in Mauken, Austria, The archaeological project at the Abbey of Niedermunster, France	2	6
Mobile Mapping: Introduction, Mobile mapping observation modes, Mobile mapping system design, Application examples, Validation of mobile mapping systems, Conclusions	2	6
Practical part: • Data acquisition using laser scanners • Visualization and Structuring of Point Clouds • Registration and Calibration, Extraction of Digital Terrain Models • Building Extraction • Mobile Mapping.	Weekly	45

2. Course components (total contact and credit hours per semester):							
		Lecture	Tutorial	Laboratory/ Studio	Practical	Other	Total
Contact Hours	Planned	30			45		75
	Actual						
Credit	Planned	2			2		3
	Actual						

3. Individual study/learning hours expected for students per week.	3

4. Course Learning Outcomes in NQF Domains of Learning and Alignment with Assessment Methods and Teaching Strategies

On the table below are the five NQF Learning Domains, numbered in the left column.

First, insert the suitable and measurable course learning outcomes required in the appropriate learning domains (see suggestions below the table). **Second**, insert supporting teaching strategies that fit and align with the assessment methods and targeted learning outcomes. **Third**, insert appropriate assessment methods that accurately measure and evaluate the learning outcome. Each course learning outcomes, assessment method, and teaching strategy should fit in together with the rest to form an integrated learning and teaching process. (Courses are not required to include learning outcomes from each domain.)

Curriculum Map

Code #	NQF Learning Domains And Course Learning Outcomes	Course Teaching Strategies	Course Assessment Methods
1.0	**Knowledge**		
1.1	To describe the main aspects of laser scanning technology.	• Lectures and training tutorials • Through group project work	• Class works. • Written and oral examinations. • Projects. • Reports.
1.2	To recognize the principles of Geometric models, Systematic error sources and models, Registration, System calibration for the laser scanning.		
1.3	To recognize the different applications of laser scanning.		
1.4	To describe the advantages and disadvantages of the laser scanning.		
2.0	**Cognitive Skills**		

2.1	To explain the main aspects of laser scanning technology.	• Lectures and training tutorials • Through group project work	• Class works. • Written and oral examinations. • Projects. • Reports.
2.2	To explain the principles of Geometric models, Systematic error sources and models, Registration, System calibration and all parameters of the laser scanning.		
2.3	To summarize the different methods of Extraction of Digital Terrain Models from the scanned data.		
2.4	To explain the different applications of laser scanning such as eengineering and cultural heritage applications.		
2.5	To summarize mobile mapping technique and its applications.		
3.0	**Interpersonal Skills & Responsibility**		
3.1	To show and evaluate the methods of airborne and terrestrial laser scanning.	• Group assignments. • Small group work.	• Class works. • Written and oral examinations. • Projects. • Reports.
3.2	To illustrate and analyze the data and information and overcoming the problems		
3.3	To act professionally and ethically in a team work.		
4.0	**Communication, Information Technology, Numerical**		
4.1	To operate effectively in civil engineering team work.	• Lectures and training tutorials • Through group project work • Through detailed research and analysis of a particular topic for laser scanning applications	• Class works. • Written and oral examinations. • Projects. • Reports.
4.2	To illustrate professional written reports, maps, and deliver professional oral and written presentations.		
4.3	To prepare our graduates to work effectively in modes ranging from independent study to multi-		

	disciplinary teams.		
5.0	**Psychomotor**		
5.1	Not applicable	Not applicable	Not applicable

5. Schedule of Assessment Tasks for Students During the Semester			
	Assessment task (i.e., essay, test, quizzes, group project, examination, speech, oral presentation, etc.)	**Week Due**	**Proportion of Total Assessment**
1	First exam	4	15 %
2	Second exam	8	10 %
3	Third Exam	12	15 %
4	Final Exam (Practical)	14	15 %
5	Final Exam	16 /17	50 %

D. Student Academic Counseling and Support

1. Arrangements for availability of faculty and teaching staff for individual student consultations and academic counseling. (include the time teaching staff are expected to be available per week)

- All faculty has allocated tutorial or consultation hours during which the concerned teaching staff is available to provide academic advising to students.
- Generally, five hours are allocated per week and displayed outside office of the concerned teaching staff to facilitate advising to the students.
- New lecturers attend a personalised programme of courses and, in the final year of probation, they assesses their teaching through direct observation and a portfolio.
- Professional Development works directly with staff who wishs to develop more effective teaching and learning methods - including the area of learning technologies - and provides resources to support the learning skills development of students.

E Learning Resources

1. List Required Textbooks

- Vosselman, G. and Maas, M. , 2010. Airborne and Terrestrial Laser Scanning. Whittles Publishing, Dunbeath, Caithness KW6 6EY, Scotland, UK.

2. List Essential References Materials (Journals, Reports, etc.)

- Australian Journal of Geodesy, Photogrammetry and Surveying. Institution of Surveyors, Australia, Canberra. QB301 .A87
- Geomatics Research Australasia. Institution of Surveyors, Australia, Canberra. QB301 .A87
- ITC Journal. The International Institute for Aerial Survey and Earth Sciences, Enschede. TA593 .I54
- ISPRS Journal of Photogrammetry and Remote Sensing. Elsevier, Amsterdam. TA593 .P52
- Journal of Spatial Science. Spatial Sciences Institute Australia. Perth. G70.212 .J68
- Photogrammetric Record. Photogrammetric Society, London. TR693 .P46

• Photogrammetric Engineering and Remote Sensing. American Society of Photogrammetry, Falls Church. TA593 .P54
3. List Electronic Materials, Web Sites, Facebook, Twitter, etc. • Websites of Laser scanning, Digital Mapping, Mobil Mapping.
4. Other learning material such as computer-based programs/CD, professional standards or regulations and software. • Latest Software and Techniques for DTM, Mobil and Digital Mapping.

F. Facilities Required

Indicate requirements for the course including size of classrooms and laboratories (i.e. number of seats in classrooms and laboratories, extent of computer access, etc.)
1. Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.) • Classroom to accommodate 15 students equipped with usual blackboard or smart board. • Computer laboratory equipped with hardware and software.
2. Technology resources (AV, data show, Smart Board, software, etc.) • Computers connected to internet and equipped with required software. • Printers. • Data show for some work presentation.
3. Other resources (specify, e.g. if specific laboratory equipment is required, list requirements or attach list) **None**

G Course Evaluation and Improvement Procedures

1. Strategies for Obtaining Student's Feedback on Effectiveness of Teaching • Student questionnaire at the end of the semester. • Student test result analysis. • Regular feedback from students.
2. Other Strategies for Evaluation of Teaching by the Instructor or the Department • Regular review of the course contents by the related department committee. • Input from visiting professors.
3. Procedures for Teaching Development • Regular updating of learning resources. • Usage of new technologies in presenting the course materials. • Self-learning. • Promote reading of outside materials. • Encouraging students to conduct scientific presentations and group discussions. • Additional training for the staff assist.
4. Procedures for Verifying Standards of Student's Achievement (e.g. check marking by an independent member teaching staff of a sample of student's work, periodic exchange and remarking of tests or a sample of assignments with staff members at another institution) • Check marking by an independent member teaching staff of a sample of student work, periodic exchange and remarking of tests or a sample of assignments with staff at another institution • A review of a sample of student answers by a related department committee. • In-department group review and marking. • External reviewer for a sample of student answering sheets.

5. Describe the planning arrangements for periodically reviewing course effectiveness and planning for developing it.

- Regular updating of learning resources.
- Usage of new technologies in presenting the course materials.
- Regular review of the course content by the related department committee.
- Input from external and internal reviewers.

Name of Course Instructor: **Dr. Khalid El-Ashmawy**

Signature: _____ **Date Completed:** _____

Program Coordinator: _____

Signature: _____ **Date Received:** _____

COURSE SPECIFICATIONS

Form

Course Title: **Computer Applications in GIS**.

Course Code: **803698-3**.

Date: 2018-10-19.	**Institution**: **Umm Al-Qura University**
College: **College of Engineering& Islamic Architecture**	**Department**: **Civil Engineering**

A. Course Identification and General Information

1. Course title and code: **Computer Applications in GIS, 803698-3**		
2. Credit hours: **3**		
3. Program(s) in which the course is offered. **Civil Engineering Department** (If general elective available in many programs indicate this rather than list programs) **Master Program in Surveying Engineering**		
4. Name of faculty member responsible for the course: **Dr. Khalid El-Ashmawy**		
5. Level/year at which this course is offered: **Elective Course**		
6. Pre-requisites for this course (if any)**: 803687-3**		
7. Co-requisites for this course (if any)		
8. Location if not on main campus		
9. Mode of Instruction (mark all that apply)		
a. Traditional classroom	✓	What percentage? 100
b. Blended (traditional and online)		What percentage?
c. E-learning		What percentage?
d. Correspondence		What percentage?
e. Other		What percentage?
Comments:		

B Objectives

1. The main objective of this course

By the end of this course, the student will be able to:

- Handle Mapping and CAD applications proficiently.
- Format the CAD data to be suitable for ArcGIS applications.
- Learn GIS.
- Learn about the professional surveying applications of ArcGIS.
- Explain the basic principles and procedures associated with application of geographic information systems (GIS) to the solution of spatial problems.
- Demonstrate practical skills such as understanding of the data collection, storage, manipulation and visualization of spatial data.
- Demonstrate a practical understanding of the principles of spatial reference systems and basic spatial analysis and visualization of spatial data using a GIS software.
- Describe how GIS can be applied in a range of situations, such as urban planning, site selection, environmental management, facilities and network management, and many more.
- Account for how different types of reference systems are built-up and how they can be used.
- Use geodetic data (which may be obtained by Total station, GNSS and levelling instruments) for updating maps, positioning and precise height determination.
- Evaluate different data sources and account for different data collection methods within GIS applications.
- Analyze geographic data and present the results in the form of thematic maps.
- Create and update maps based on data acquired from different sources.

2. Describe briefly any plans for developing and improving the course that are being implemented. (e.g. increased use of the IT or online reference material, changes in content as a result of new research in the field)

- Increasing the number of computers.
- E- learning
- Video conference
- Increased use of IT or web based reference material,
- Changes in content as a result of new research in the field

C. Course Description (Note: General description in the form used in the program's bulletin or handbook)

Course Description:

Create and manage data, maps, and analytical models with ArcGIS. Getting around maps and start adding data and importing data from existing databases. Selecting and editing individual map elements, and connect to advanced geospatial data sources. Working with vector vs. raster data, legend, scale bar, and annotations.

1. Topics to be Covered

List of Topics	No. of Weeks	Contact Hours
Learning main menus and options of ArcGIS	2	6
The necessity of Layers for ArcGIS applications	2	6
Create and manage data, maps, and analytical models with ArcGIS.	2	6
Importing CAD maps to ArcGIS	2	6
Getting around maps and start adding data and importing data from existing databases.	2	6
Selecting and editing individual map elements, and connect to advanced geospatial data sources.	2	6
Working with vector vs. raster data, legend, scale bar, and annotations.	3	6
Practical part: • Importing CAD maps to ArcGIS • Getting around maps and start adding data and importing data from existing databases. • Selecting and editing individual map elements, and connect to advanced geospatial data sources. • Working with vector vs. raster data, legend, scale bar, and annotations. • Surveying applications	Weekly	45

2. Course components (total contact and credit hours per semester):

		Lecture	Tutorial	Laboratory/ Studio	Practical	Other	Total
Contact Hours	Planned	30			45		75
	Actual						
Credit	Planned	2			1		3
	Actual						

3. Individual study/learning hours expected for students per week. 3

4. Course Learning Outcomes in NQF Domains of Learning and Alignment with Assessment Methods and Teaching Strategies

On the table below are the five NQF Learning Domains, numbered in the left column.

First, insert the suitable and measurable course learning outcomes required in the appropriate learning domains (see suggestions below the table). **Second**, insert supporting teaching strategies that fit and align with the assessment methods and targeted learning outcomes. **Third**, insert appropriate assessment methods that accurately measure and evaluate the learning outcome. Each course learning outcomes, assessment method, and teaching strategy should fit in together with the rest to form an integrated learning and teaching process. (Courses are not required to include learning outcomes from each domain.)

Curriculum Map

Code #	NQF Learning Domains And Course Learning Outcomes	Course Teaching Strategies	Course Assessment Methods
1.0	**Knowledge**		
1.1	To inform the student about the main applications of ArcGIS software	• Lectures and training tutorials • Through group project work • Through detailed research and analysis of a particular topic for surveying applications.	• Class works. • Written and oral examinations. • Projects. • Reports.
1.2	To enables the student to use ArcGIS in the surveying applications.		
2.0	**Cognitive Skills**		
2.1	To inform the student about ArcGIS software and its applications for surveying.	• Lectures and training tutorials • Through group project work Through detailed research and analysis of a particular topic for surveying applications.	• Class works. • Written and oral examinations. • Projects. • Reports.
2.2	Analyze and solve surveying problems.		
2.3	Team work in project and writing reports		
3.0	**Interpersonal Skills & Responsibility**		
3.1	To increase the ability to understand problems and issues related to Surveying, Mapping and computations.	• Lectures and training tutorials • Through group project work • Through detailed research and analysis of a particular topic for surveying applications	• Class works. • Written and oral examinations. • Projects. • Reports.
3.2	To interpret the data and information and overcoming the problems		
3.3	To prepare our post graduates for immediate employment and studying in any primary branch of civil		

	engineering.		
4.0	**Communication, Information Technology, Numerical**		
4.1	To facilitate and engages in activities that systematically conduct, act upon, and report assessment of individual student educational performance and evaluation of the instructional program.	• Lectures and training tutorials • Through group project work • Through detailed research and analysis of a particular topic for surveying applications	• Class works. • Written and oral examinations. • Projects. • Reports.
4.2	To facilitate and engages in activities that in form the organizations decision-making by collecting and organizing a variety of formal and informal information from multiple stakeholders.		
4.3	To prepare our graduates to work effectively in modes ranging from independent study to multi-disciplinary teams.		
5.0	**Psychomotor**		
5.1	Not applicable	Not applicable	Not applicable

5. Schedule of Assessment Tasks for Students During the Semester

	Assessment task (i.e., essay, test, quizzes, group project, examination, speech, oral presentation, etc.)	Week Due	Proportion of Total Assessment
1	First exam	4	10 %
2	Second exam	8	10 %
3	Third Exam	12	15 %
4	Final Exam (Practical)	14	15 %
5	Final Exam	16 /17	50 %

D. Student Academic Counseling and Support

1. Arrangements for availability of faculty and teaching staff for individual student consultations and academic counseling. (include the time teaching staff are expected to be available per week)

- All faculty has allocated tutorial or consultation hours during which the concerned teaching staff is available to provide academic advising to students.

- Generally, five hours are allocated per week and displayed outside office of the concerned teaching staff to facilitate advising to the students.
- New lecturers attend a personalised programme of courses and, in the final year of probation, they assesses their teaching through direct observation and a portfolio.
- Professional Development works directly with staff who wishs to develop more effective teaching and learning methods - including the area of learning technologies - and provides resources to support the learning skills development of students.

E Learning Resources

1. List Required Textbooks
   - Esri, 2016. The ArcGIS Book: 10 Big Ideas about Applying The Science of Where, Esri Press, 380 New York Street, Redlands, California 92373-8100, USA
   - REDLANDS, Calif, 2018. Understanding GIS: An ArcGIS Pro Project Workbook, Fourth Edition, Esri Press, 380 New York Street, Redlands, California 92373-8100, USA

2. List Essential References Materials (Journals, Reports, etc.)
   - Esri publications
   - ArcGIS manuals and website.

3. List Electronic Materials, Web Sites, Facebook, Twitter, etc.
   - Websites of software companies.

4. Other learning material such as computer-based programs/CD, professional standards or regulations and software.
   - Latest Software and Techniques

F. Facilities Required

Indicate requirements for the course including size of classrooms and laboratories (i.e. number of seats in classrooms and laboratories, extent of computer access, etc.)

1. Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)
   - Classroom to accommodate 15 students equipped with usual blackboard or smart board.
   - Computer laboratory equipped with hardware and software.

2. Technology resources (AV, data show, Smart Board, software, etc.)
   - Computers connected to internet and equipped with required software.
   - Printers.
   - Data show for some work presentation.

3. Other resources (specify, e.g. if specific laboratory equipment is required, list requirements or attach list)

None

G Course Evaluation and Improvement Procedures

1. Strategies for Obtaining Student's Feedback on Effectiveness of Teaching
   - Student questionnaire at the end of the semester.
   - Student test result analysis.
   - Regular feedback from students.

2. Other Strategies for Evaluation of Teaching by the Instructor or the Department
   - Regular review of the course contents by the related department committee.
   - Input from visiting professors.

3. Procedures for Teaching Development

- Regular updating of learning resources.
- Usage of new technologies in presenting the course materials.
- Self-learning.
- Promote reading of outside materials.
- Encouraging students to conduct scientific presentations and group discussions.
- Additional training for the staff assist.

4. Procedures for Verifying Standards of Student's Achievement (e.g. check marking by an independent member teaching staff of a sample of student's work, periodic exchange and remarking of tests or a sample of assignments with staff members at another institution)

- Check marking by an independent member teaching staff of a sample of student work, periodic exchange and remarking of tests or a sample of assignments with staff at another institution
- A review of a sample of student answers by a related department committee.
- In-department group review and marking.
- External reviewer for a sample of student answering sheets.

5. Describe the planning arrangements for periodically reviewing course effectiveness and planning for developing it.

- Regular updating of learning resources.
- Usage of new technologies in presenting the course materials.
- Regular review of the course content by the related department committee.
- Input from external and internal reviewers.

Name of Course Instructor: **Dr. Khalid El-Ashmawy**

Signature: _____ **Date Completed:** _____

Program Coordinator: _____

Signature: _____ **Date Received:** _____