



جامعة المجمعة  
Majmaah University

رؤية  
VISION  
2030  
المملكة العربية السعودية  
KINGDOM OF SAUDI ARABIA

# COURSE SPECIFICATIONS (CS)

**Ramadan 1438 H , June 2017**

|                               |                                      |
|-------------------------------|--------------------------------------|
| Institution:                  | Majmaah University                   |
| Academic Department :         | Civil and Environmental Engineering. |
| Programme:                    | Civil Engineering                    |
| Course title and code:        | Photogrammetry – CE 474              |
| Specification Approved Date : | 29/ 01 / 1439 H                      |

## Course Specifications

|                                                                                          |                         |
|------------------------------------------------------------------------------------------|-------------------------|
| <b>Institution: Majmaah University</b>                                                   | <b>Date: 17/10/2017</b> |
| <b>College/Department : Engineering – Civil and Environmental Engineering Department</b> |                         |

### A. Course Identification and General Information

|                                                                                                                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                  |                                  |                          |                                     |                  |                                  |                                     |                                     |                  |                                  |               |                          |                  |                      |                   |                          |                  |                      |          |                                     |                  |                                  |
|-------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------|----------------------------------|--------------------------|-------------------------------------|------------------|----------------------------------|-------------------------------------|-------------------------------------|------------------|----------------------------------|---------------|--------------------------|------------------|----------------------|-------------------|--------------------------|------------------|----------------------|----------|-------------------------------------|------------------|----------------------------------|
| 1. Course title and code:                                                                                                                 | <b>Photogrammetry – CE 474</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                  |                                  |                          |                                     |                  |                                  |                                     |                                     |                  |                                  |               |                          |                  |                      |                   |                          |                  |                      |          |                                     |                  |                                  |
| 2. Credit hours:                                                                                                                          | <b>3 [3-1-0]</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                  |                                  |                          |                                     |                  |                                  |                                     |                                     |                  |                                  |               |                          |                  |                      |                   |                          |                  |                      |          |                                     |                  |                                  |
| 3. Program(s) in which the course is offered.<br>(If general elective available in many programs indicate this rather than list programs) |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                  |                                  |                          |                                     |                  |                                  |                                     |                                     |                  |                                  |               |                          |                  |                      |                   |                          |                  |                      |          |                                     |                  |                                  |
| 4. Name of faculty member responsible for the course                                                                                      | <b>Dr. Sameh S Ahmed</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                  |                                  |                          |                                     |                  |                                  |                                     |                                     |                  |                                  |               |                          |                  |                      |                   |                          |                  |                      |          |                                     |                  |                                  |
| 5. Level/year at which this course is offered:                                                                                            | <b>9/4</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                  |                                  |                          |                                     |                  |                                  |                                     |                                     |                  |                                  |               |                          |                  |                      |                   |                          |                  |                      |          |                                     |                  |                                  |
| 6. Pre-requisites for this course (if any):                                                                                               | <b>CE 372</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                  |                                  |                          |                                     |                  |                                  |                                     |                                     |                  |                                  |               |                          |                  |                      |                   |                          |                  |                      |          |                                     |                  |                                  |
| 7. Co-requisites for this course (if any):                                                                                                | -                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                  |                                  |                          |                                     |                  |                                  |                                     |                                     |                  |                                  |               |                          |                  |                      |                   |                          |                  |                      |          |                                     |                  |                                  |
| 8. Location if not on main campus:                                                                                                        | -                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                  |                                  |                          |                                     |                  |                                  |                                     |                                     |                  |                                  |               |                          |                  |                      |                   |                          |                  |                      |          |                                     |                  |                                  |
| 9. Mode of Instruction (mark all that apply):                                                                                             | <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 30%;">a. traditional classroom</td> <td style="width: 10%; text-align: center;"><input checked="" type="checkbox"/></td> <td style="width: 40%;">What percentage?</td> <td style="width: 20%; text-align: center;"><input type="text" value="70%"/></td> </tr> <tr> <td>b. blended (traditional and online)</td> <td style="text-align: center;"><input checked="" type="checkbox"/></td> <td>What percentage?</td> <td style="text-align: center;"><input type="text" value="20%"/></td> </tr> <tr> <td>c. e-learning</td> <td style="text-align: center;"><input type="checkbox"/></td> <td>What percentage?</td> <td style="text-align: center;"><input type="text"/></td> </tr> <tr> <td>d. correspondence</td> <td style="text-align: center;"><input type="checkbox"/></td> <td>What percentage?</td> <td style="text-align: center;"><input type="text"/></td> </tr> <tr> <td>f. other</td> <td style="text-align: center;"><input checked="" type="checkbox"/></td> <td>What percentage?</td> <td style="text-align: center;"><input type="text" value="10%"/></td> </tr> </table> |                  |                                  | a. traditional classroom | <input checked="" type="checkbox"/> | What percentage? | <input type="text" value="70%"/> | b. blended (traditional and online) | <input checked="" type="checkbox"/> | What percentage? | <input type="text" value="20%"/> | c. e-learning | <input type="checkbox"/> | What percentage? | <input type="text"/> | d. correspondence | <input type="checkbox"/> | What percentage? | <input type="text"/> | f. other | <input checked="" type="checkbox"/> | What percentage? | <input type="text" value="10%"/> |
| a. traditional classroom                                                                                                                  | <input checked="" type="checkbox"/>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | What percentage? | <input type="text" value="70%"/> |                          |                                     |                  |                                  |                                     |                                     |                  |                                  |               |                          |                  |                      |                   |                          |                  |                      |          |                                     |                  |                                  |
| b. blended (traditional and online)                                                                                                       | <input checked="" type="checkbox"/>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | What percentage? | <input type="text" value="20%"/> |                          |                                     |                  |                                  |                                     |                                     |                  |                                  |               |                          |                  |                      |                   |                          |                  |                      |          |                                     |                  |                                  |
| c. e-learning                                                                                                                             | <input type="checkbox"/>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | What percentage? | <input type="text"/>             |                          |                                     |                  |                                  |                                     |                                     |                  |                                  |               |                          |                  |                      |                   |                          |                  |                      |          |                                     |                  |                                  |
| d. correspondence                                                                                                                         | <input type="checkbox"/>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | What percentage? | <input type="text"/>             |                          |                                     |                  |                                  |                                     |                                     |                  |                                  |               |                          |                  |                      |                   |                          |                  |                      |          |                                     |                  |                                  |
| f. other                                                                                                                                  | <input checked="" type="checkbox"/>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | What percentage? | <input type="text" value="10%"/> |                          |                                     |                  |                                  |                                     |                                     |                  |                                  |               |                          |                  |                      |                   |                          |                  |                      |          |                                     |                  |                                  |
| <b>Comments:</b>                                                                                                                          | <p style="color: red;">The course involves class room teaching with exclusive exercises. The teaching involves explanations &amp; discussions subsequently with preparation of reports and additional work as assignments.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                  |                                  |                          |                                     |                  |                                  |                                     |                                     |                  |                                  |               |                          |                  |                      |                   |                          |                  |                      |          |                                     |                  |                                  |

## B Objectives

1. What is the main purpose for this course?

- Recognize and tell main concepts in Photogrammetry including types of aerial photographs and cameras.
- Calculate, design and measure distances and areas from aerial photographs.
- Estimate and calculate the height of objects from aerial photographs.
- Prepare the stereoscopes vision for a pair of photographs and conduct necessary measurements.
- Explain Parallax theory and techniques of plotter orientation.
- Ability to extraction of engineering information from single and two aerial photo and analyse the data.
- Plan a photogrammetric project and able to calculate number of required photos and films for the task.
- Demonstrate their teamwork and leadership skills through functioning in groups during executing a mini-project.

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

Getting stereoscopic instruments and some aerial photographs for practical measurements of heights.

Reserving 4-6 hrs for practice on Software to built DTM from aerial photos.

## C. Course Description (Note: General description in the form used in Bulletin or handbook)

Course Description:

The history of photogrammetry, aerial cameras and camera calibration, geometry of the aerial photograph, stereoscopy and stereoscopes, parallax and the theory and techniques of plotter orientation. Extraction of engineering information from single aerial photo and from two interfaced photos, transformation, least squares, preparation and measuring of coordinates from aerial photos, introduction to analytical photogrammetric surveying, outputs of aerial surveying, Planning a photogrammetric project, Applications using computer software's.

| 1. Topics to be Covered                                                                                                                                                          |              |               |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|---------------|
| List of Topics                                                                                                                                                                   | No. of Weeks | Contact hours |
| History of Photogrammetry                                                                                                                                                        | 1            | 4             |
| Aerial cameras and Camera calibration                                                                                                                                            | 2            | 8             |
| Geometry of the aerial photograph:<br>Principles points - Ground points - Control points - Central Projection - Interior and Exterior Orientation - Image Capture Practicalities | 2            | 8             |
| Stereoscopy and stereoscopes                                                                                                                                                     | 1            | 4             |
| Parallax theory and techniques of plotter orientation                                                                                                                            | 1            | 4             |

|                                                                            |           |           |
|----------------------------------------------------------------------------|-----------|-----------|
| Midterm 1                                                                  | 1         | 4         |
| Extraction of engineering information from single aerial photo             | 1         | 4         |
| Extraction of engineering information from two aerial photos               | 2         | 8         |
| Least squares, preparation and measuring of coordinates from aerial photos | 1         | 4         |
| Planning a photogrammetric project                                         | 1         | 4         |
| Midterm-II                                                                 | -         | -         |
| Project #2, Cont.                                                          | 1         |           |
| Applications using computer software's                                     | 1         | 8         |
| <b>Total</b>                                                               | <b>15</b> | <b>60</b> |

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

|                      |         | Lecture   | Tutorial  | Laboratory/<br>Studio | Practical | Other: | Total     |
|----------------------|---------|-----------|-----------|-----------------------|-----------|--------|-----------|
| <b>Contact Hours</b> | Planned | <b>45</b> | <b>15</b> | <b>0</b>              |           |        | <b>60</b> |
|                      | Actual  | 43        | 14        | 0                     |           |        | 57        |
| <b>Credit</b>        | Planned | <b>3</b>  | <b>0</b>  | <b>0</b>              |           |        | <b>3</b>  |
|                      | Actual  | 3         | 0         | 0                     |           |        | 3         |

**3. Additional private study/learning hours expected for students per week.**

Two to three hours per week on an average for self-study and problem solving

**2-3 hrs**

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

**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 intended learning outcomes. **Third**, insert appropriate assessment methods that accurately measure and evaluate the learning outcome. Each course learning outcomes, assessment method, and teaching strategy ought to reasonably fit and flow together as an integrated learning and teaching process. (Courses are not required to include learning outcomes from each domain.)

| Code #     | NQF Learning Domains And Course Learning Outcomes                                                                             | Course Teaching Strategies                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Course Assessment Methods                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|------------|-------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>1.0</b> | <b>Knowledge</b>                                                                                                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| 1.1        | The students will be able to know the history of developing the subject of photogrammetric surveying.                         | <ul style="list-style-type: none"> <li>- Course delivery by citing real life examples and problems.</li> <li>- Emphasis on understanding concepts and illustrating applications to problems.</li> </ul> <p>Placing before the class mind-provoking and thinking questions.</p>                                                                                                                                                                                              | <ul style="list-style-type: none"> <li>• Regularly asking questions on different topics and concepts.</li> <li>• Midterm and End-semester examinations that will force the student to think and apply the knowledge. Reports and discussions.</li> </ul>                                                                                                                                                                                                                                      |
| 1.2        | The students will be able to write about different cameras used in photogrammetric surveying                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| 1.3        | The students will be able to tell types of aerial photos                                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| 1.4        | The students will be able to recognize the use of photogrammetric surveying.                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| 1.5        | The students will be able to describe digital mapping process.                                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| <b>2.0</b> | <b>Cognitive Skills</b>                                                                                                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| 2.1        | The students will be able to calculate, design and measure distances and areas from aerial photographs                        | <ul style="list-style-type: none"> <li>- Solving problems through assignments on each topic.</li> <li>- Assignment problems, Exercise / tutorial problems for applications that will force the students to think and apply the knowledge gained.</li> <li>- Asking the students to suggest a solution before giving them the correct answer.</li> </ul> <p>Asking the students to explain the steps adopted in the problem and ensures that they understand the problem</p> | <ul style="list-style-type: none"> <li>• Asking the student to solve the problems on white board guiding him when required.</li> <li>• Quizzes and Exams.</li> <li>• Asking students to participate in oral discussion during the class.</li> <li>• Setting assignment problems or mini project which will apply principles and concepts.</li> </ul> <p>Questions in Quiz, Midterm and End semester tests which will force the student to think and apply concepts and principles learnt.</p> |
| 2.2        | The students will be able to estimate and calculate the height of objects from aerial photographs                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| 2.3        | The students will be able to prepare the stereoscopes vision for a pair of photographs and conduct necessary measurements     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| 2.4        | The students will be able to Explain Parallax theory and techniques of plotter orientation                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| 2.5        | The students will be able to extraction of engineering information from single and two aerial photo and analyse the data      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| 2.6        | The students will be able to plan a photogrammetric project and to calculate number of required photos and films for the task |                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |

|            |                                                                                                        |                                                                                                                                  |                                                                                                                                      |
|------------|--------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------|
| <b>3.0</b> | <b>Interpersonal Skills &amp; Responsibility</b>                                                       |                                                                                                                                  |                                                                                                                                      |
| <b>3.1</b> | The students will be able to demonstrate their skills in the subject and be able to assess themselves. | - Solve the problems by asking sequential questions.<br>Paying personal attention to each student and caring about his situation | • Group work in report work and team activity.<br>Bonus marks to those who are improving and participating effectively in the class. |
| <b>3.2</b> |                                                                                                        |                                                                                                                                  |                                                                                                                                      |
| <b>4.0</b> | <b>Communication, Information Technology, Numerical</b>                                                |                                                                                                                                  |                                                                                                                                      |
| <b>4.1</b> | The students will be able to communicate effectively and engage in long life learning                  | Reports and seminars                                                                                                             | Evaluation of student ability to report and present facts                                                                            |
| <b>5.0</b> | <b>Psychomotor</b>                                                                                     |                                                                                                                                  |                                                                                                                                      |
| <b>5.1</b> | NA                                                                                                     |                                                                                                                                  |                                                                                                                                      |

| <b>5. Schedule of Assessment Tasks for Students During the Semester</b> |                                                                                                                  |                 |                                       |
|-------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------|-----------------|---------------------------------------|
|                                                                         | <b>Assessment task (i.e., essay, test, quizzes, group project, examination, speech, oral presentation, etc.)</b> | <b>Week Due</b> | <b>Proportion of Total Assessment</b> |
| <b>1</b>                                                                | First midterm exam                                                                                               | 8               | 20                                    |
| <b>2</b>                                                                | Second midterm exam                                                                                              | 14              | 20                                    |
| <b>3</b>                                                                | Quizzes                                                                                                          |                 | 10                                    |
| <b>4</b>                                                                | Report, and homework assignments                                                                                 |                 | 10                                    |
| <b>5</b>                                                                | Final Exam                                                                                                       | 15              | 40                                    |
|                                                                         | Total                                                                                                            |                 | 100                                   |

### **D. Student Academic Counseling and Support**

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

Every day one hour is marked as Office Hour in the Time Table of teaching staff.  
During this hour the students can consult the teacher individually or in a group for their



difficulties in the subject.

## E Learning Resources

1. List Required Textbooks

Paul R. Wolf, "Elements of Photogrammetry", Mc Graw Hill, (Latest edition).

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

Burr, F. K. and Glemen Bird, S. J., "Surveying, Principles and Applications", Prentice Hall, 2000.

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

Selected Papers and demonstrations from trustable web sites

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

Available ARC/GIS 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.)

- Lecture room available - (20 students/class - this semester we have 6 students) to avoid student movement. It is necessary to keep lectures for one course / level in the same classroom.
- Some pocket stereoscopic instruments and aerial photographs are needed.

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

Available for students in the GIS Lab.

Smart board and data show are available in the class rooms.

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

Some instruments for aerial photogrammetric surveying are required.

## G Course Evaluation and Improvement Processes

1. Strategies for Obtaining Student Feedback on Effectiveness of Teaching

Importance of feedback should be first explained. Only then the feedback should be taken. Have a question as to how the teaching can be improved - speed, more problems etc.



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

- Ask the students if the speed of teaching and the approach is helping the students in learning the subject.
- Students are free to report any difficulties to the Head of the department.

3. Processes for Improvement of Teaching

- Review of strategy at the mid-semester and after assessment of Mid Term - 1.
- Group discussion and using different ways in teaching (seminars, Power point presentations, reading, conducting more field works, etc.)

4. Processes for Verifying Standards of Student Achievement (e.g. 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)

- Independent checking of End-Semester assessment (another faculty member)
- Checking of course files by the Quality Centre Nominee and give suggestions for improvement in writing.

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

- Mid Semester review of Course files.
- End Semester review of Course files.
- Student feedback at end of the semester from CEE-Quality Unit.
- Feedback of the assessment at the beginning of the next semester.
- Departmental meeting at the beginning of the next semester on improvements suggested.

Name of Course Instructor: Dr. Sameh S Ahmed

Signature: *Sameh*

Date Specification Completed: 17/10/1017

Program Coordinator: Dr. Abdullah Alshehri

Signature: *Alshehri*

Date Received: 19/10/2017