**Course Specification**

**1. Basic Information:**

|  |  |
| --- | --- |
| **Program Title** | Construction Engineering and Management |
| **Department Offering the course** | Construction Engineering and Management |
| **Date of Specification Approval** |  |
| **Course Title** | Surveying for Engineering I | **Code** | CMC 207 |
| **Type** | **Compulsory** [x]  | **Elective** [ ]  |
| **Semester** | Fall Semester (Second Level) |
| **Teaching Hours** | **Lec.** | **Tut.** | **Lab.** | **Credit hours** |
| 2 | 2 | 1 | 3 |

**2. Professional Information:**

**2.1. Course Description:**

Measurement systems and equipment- Handling, adjustment, and regular maintenance of Survey equipment. Theodolites and level instruments- principles of measurements; angular measurements; traverse computations and adjustments. Distance measurements, optical (tacheometric, substance bar), EDM; area computations and subdivision of plots; spirit and trigonometrical levelling; introduction to triangulation, trilateration, resection, intersection and radiation as methods for provision of controls. Coordinate systems for engineering works: Setting out of engineering works. Areas of irregular objects, Longitudinal sections and cross sections- formation level, calculation of cross-sectional areas- Volumes- the end areas method, the prismoidal method, volumes of large earthworks. Balance of cut and fill, volumes from contours. Mass haul diagrams cumulative volumes bulking and shrinkage factor correction.

**2.2. Course Objectives (CO):**

|  |  |
| --- | --- |
| **Program objective** | **Course objective** |
| **PO1**  | **Apply** a wide spectrum of engineering knowledge, science, and specialized skills with analytic, critical, and systemic thinking to identify and **solve** engineering problems in real-life situations. | **CO1** | **Apply** wide sets of surveying knowledge, science, and specialized skills with analytic, critical, and systemic thinking to identify and **solve** surveying problems in real-life situations. |
| **PO5** | Apply analytical, **experimental**, design, construction engineering techniques and project management skills with proficiency aided by modern tools. | **CO2** | **Practice** the **experimental**, and surveying techniques and skills with proficiency using modern surveying instruments in a work team. |

**2.3. Course Learning Outcomes (CLOs):**

|  |  |
| --- | --- |
| **Program Learning Outcomes** | **Course Learning Outcomes** |
| **PLO2** | Develop and conduct appropriate experimentation and/or simulation, analyze and interpret data, assess and evaluate findings, and use statistical analyses and objective engineering judgment to draw conclusions. | **CLO5** | **Apply** the fundamental concepts of using tapes, theodolite, and Level instruments. |
| **PLO7** | Function efficiently as an individual and as **a member** of multi-disciplinary and multi-cultural teams. | **CLO6** | **Use** different survey instruments, (tap, theodolite, and level) efficiently as **a member in a working group** in engineering projects. |
| **PLO11** | Select appropriate and sustainable technologies for the construction of buildings, infrastructures, and water structures; using either numerical techniques or physical measurements and/or testing by applying a full range of civil engineering concepts and techniques of: Structural Analysis and Mechanics, Properties and Strength of Materials, Surveying, Soil Mechanics, Hydrology and Fluid Mechanics. | **CLO1** | **Identify** the basic principles of a plane and topographic survey. |
| **CLO2** | **Determine** horizontal and vertical angles, horizontal distance, and reduced level of points. |
| **CLO3** | **Calculate** the coordinate of the traverse, adjust it, and solve the intersection and resection problems. |
| **CLO4** | **Predict** the area and volume of the project. |

**2.4. Course Topics:**

|  |  |  |
| --- | --- | --- |
| **Course Topics** | **Week** | **Course LO’s Covered** |
| **CLO1** | **CLO2** | **CLO3** | **CLO4** | **CLO5** | **CLO6** |
| 1. **Introduction to Surveying**
 | 1,2 | √ |  |  |  | √ | √ |
| 1. **Angular Measurement and Theodolite**
 | 3,4 |  | √ |  |  | √ | √ |
| 1. **Distance measurements**
 | 5 |  | √ |  |  |  |  |
| 1. **Traversing computation**
 | 6 |  |  | √ |  |  |  |
| 1. **First Exam**
 | 7 | √ | √ |  |  |  |  |
| 1. **Traversing adjustment**
 | 8 |  |  | √ |  |  |  |
| 1. **Intersection and Resection**
 | 9 |  |  | √ |  |  |  |
| 1. **Levelling**
 | 10,11 | √ | √ |  |  | √ | √ |
| 1. **Second Exam**
 | 12 | √ | √ | √ |  | √ |  |
| 1. **Areas Computation**
 | 13 |  |  |  | √ |  |  |
| 1. **Volumes Computation**
 | 14 |  |  |  | √ |  |  |
| 1. **Review**
 | 15 | √ | √ | √ | √ |  |  |
| 1. **Final Exam**
 | 16 | √ | √ | √ | √ |  |  |
| **Total** | **16** | **5** | **6** | **4** | **3** | **5** | **5** |

**2.5. Lab Topics:**

|  |  |  |
| --- | --- | --- |
| **Lab Topics** | **Week** | **Course LO’s Covered** |
| **CLO1** | **CLO2** | **CLO3** | **CLO4** | **CLO5** | **CLO6** |
| Use the Tapes to adjust the survey laboratory. | 1 |  |  |  |  | **√** | **√** |
| Theodolite instrument | 3,4 |  |  |  |  | **√** | √ |
| Level instrument. | 10,11 |  |  |  |  | √ | √ |
|  Oral & Experimental Test | 12 |  |  |  |  | √ |  |
| **Total** | **8** |  |  |  |  | **5** | **5** |

**2.6 Teaching and Learning Methods**

|  |  |
| --- | --- |
| **Teaching and Learning Methods:** | **Course LO’s Covered** |
| **CLO1** | **CLO2** | **CLO3** | **CLO4** | **CLO5** | **CLO6** |
| 1. Lecture
 | √ | √ | √ | √ |  |  |
| 1. Tutorials
 |  | √ | √ | √ |  |  |
| 1. Practical-based Learning
 |  |  |  |  | √ |  |
| 1. Problem-based Learning
 |  | √ | √ | √ |  |  |
| 1. Co-operative Learning
 |  |  |  |  |  | √ |
| **Teaching and Learning Methods for Students with Special Needs:** |
| **Methods** |
| 1. Discussion Session |
| 2. Extra Lectures |
| 3. Provide different levels of books and materials |

**2.7 Assessment Methods**

|  |  |
| --- | --- |
| **Assessment Methods:** | **Course LOs Covered** |
| **CLO1** | **CLO2** | **CLO3** | **CLO4** | **CLO5** | **CLO6** |
| **Formative Assessment Method** |
| **Tests** | **Oral Test** |  |  |  |  | √ |  |
| **First Exam** | √ | √ |  |  |  |  |
| **Second Exam** | √ | √ | √ |  |  |  |
| **Experimental Test** |  |  |  |  | √ |  |
| **Discussion** |  | √ | √ | √ |  |  |
| **Observation** |  |  |  |  |  | √ |
| **Summative Assessment Method** |
| **Final Exam** | √ | √ | √ | √ |  |  |

**2.7.1. Assessment Schedule & Grades Distribution**

|  |  |  |
| --- | --- | --- |
| **Assessment Method** | **Week** | **The weighting of Assessment %** |
| **Formative Assessment Method** |
| **Tests** | **First Exam** | 7 | 30% |
| **Second Exam** | **Written** | 12 | 10% |
| **Oral Test** | 5% |
| **Experimental** | 5% |
| **Discussion** | 3,5,8,10,13 | 5 % |
| **Observation** | 1,3,4,10,11 | 5 % |
| **Summative Assessment Method** |
| **Final Exam** | 16 | 40 % |
| **Total** | 100 % |

**2.8. List of References:**

|  |  |
| --- | --- |
| Course Notes: | * Lecturer Notes
 |
| Essential Books (Textbooks): | * Surveying for Civil and Mine Engineers Theory, Workshops, and Practicals-John Walker Joseph L. Awange- **2018**-ISBN 978-3-319-53128-1- ISBN 978-3-319-53129-8 (eBook)
 |
| Recommended Books: | * Elementary Surveying - An Introduction to Geomatics -Thirteenth Edition-2012-CHARLES D. GHILANI-ISBN-13: 978-0-13-255434-3- ISBN-10: 0-13-255434-8
* Surveying Engineering & Instruments- Valeria Shank- First Edition-2012- ISBN 978-81-323-4403-2
 |

**2.9. Facilities required for Teaching and Learning**

|  |  |
| --- | --- |
| **Different Facilities** |  |
| Lecture Hall | √ |
| Laboratory Usage | √ |
| Data Show | √ |
| White Board | √ |

**3. Matrix:**

**3.1. Program Objectives VS Course Objectives**

|  |  |
| --- | --- |
| **Program Objectives** | **Course Objectives** |
| **CO1** | **CO2** |
| **PO1** | √ |  |
| **PO5**  |  | √ |

**3.2. Course Objectives VS Course Learning Outcomes**

|  |  |
| --- | --- |
| **Course Objectives** | **Course Learning Outcomes** |
| **CLO1** | **CLO2** | **CLO3** | **CLO4** | **CLO5** | **CLO6** |
| **CO1**  | √ | √ | √ | √ |  |  |
| **CO2**  |  |  |  |  | √ | √ |

**3.3. Program Learning Outcomes VS Course Learning Outcomes**

|  |  |
| --- | --- |
| **Program Learning Outcomes** | **Course Learning Outcomes** |
| **CLO1** | **CLO2** | **CLO3** | **CLO4** | **CLO5** | **CLO6** |
| **PLO2**  |  |  |  |  | **√** |  |
| **PLO7** |  |  |  |  |  | **√** |
| **PLO11** | **√** | **√** | **√** | **√** |  |  |

**3.4. Assessment Alignment Matrix**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **PLO** | **PO** | **CLOs** | **Teaching M.** | **Assessment** |
| **PLO2** | **PO5** | **CLO5** | Practical-based Learning | Oral and Experimental Test |
| **PLO7** | **CLO6** | Co-operative Learning | Observation |
| **PLO11** | **PO1** | **CLO1** | Lecture | First , Second and Final Exams. |
| **CLO2** | Lecture | First , Second and Final Exams. |
| Tutorials |
| Problem-based Learning | Discussion |
| **CLO3** | Lecture | Second and Final Exams. |
| Tutorials |
| Problem-based Learning | Discussion |
| **CLO4** | Lecture | Final Exam. |
| Tutorials |
| Problem-based Learning | Discussion |

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**Date:5 /11 /2022**