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| <b>Date:</b>                           | Examination No.: 3  | Version: 2022-2023 | Start: 1 / 10 /2023 |
| <b>Module Name - Code</b>              | Navigation Systems - 7137   |                    |                     |
| <b>Module Language:</b>                | English   |                    |                     |
| <b>Responsible:</b>                    | Asst. Prof. Dr. Mohammed Anwer Jassim   |                    |                     |
| <b>Lecture (s):</b>                    | Weekly  |                    |                     |
| <b>College:</b>                        | College of Engineering – Salahaddin University-Erbil  |                    |                     |
| <b>Duration:</b>                       | 15 week – 1 semester  |                    |                     |
| <b>Course outcomes:</b>                | <p>The course will introduce the students to principles and requirements in the following systems:</p> <p>1- GPS and GNSS positioning systems.</p> <p>2- Principles and methods of positioning using these modern systems.</p>  |                    |                     |
| <b>Course Content:</b>                 | <p>The course gives the fundamental framework and applications of modern global navigation satellite systems (GNSS) and inertial navigation systems (GPS). This course explores the use of satellite systems: GPS, GLONASS, GALILIO and other satellites systems for the real-time determination of horizontal position and attitude of points. It is emphasis on the historical importance of navigation systems; avionics navigation systems for high performance aircraft; the Global Positioning System; the relationships between navigation, cartography, surveying, and astronomy; and emerging trends for integrating various navigation techniques into single, tightly coupled systems.</p> |                    |                     |
| <b>Literature:</b>                     | <ul style="list-style-type: none"> <li>• Ghilani C. D. and P. R. Wolf 2006 " Adjustment computations: spatial data analysis.</li> <li>• Basic principles of inertial navigation. Seminar on inertial navigation systems. Tampere University of Technology.</li> <li>• Satellite-based positioning (I). Lecture 10. Simona Lohan. TLT 5606.</li> <li>•</li> <li>• Survey adjustments and least squares. By H.F. Rainsford 1979.</li> </ul>   |                    |                     |
| <b>Type of Teaching:</b>               | 2 hrs. in theoretical lectures and 3 practical hrs.   |                    |                     |
| <b>Pre-requisites:</b>                 |   |                    |                     |
| <b>Preparation Modules:</b>            |   |                    |                     |
| <b>Frequency:</b>                      | Fall Semester   |                    |                     |
| <b>Requirements for credit points:</b> | <p>For the award of credit points, it is necessary to pass the module exam. It contains: Two examinations during the academic semester, Assignments and Final examination.</p> <p><b>Student's attendance is required in all classes.</b></p>   |                    |                     |
| <b>Credit point:</b>                   | 5   |                    |                     |

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| <b>Grade Distribution:</b> | <p>The following grade system is used for the evaluation of the module exam:<br/>The module exam is based on the summation of two categories of evaluations:</p> <p><b>First: (40%)</b> of the mark is based on the academic semester effort which includes</p> <ul style="list-style-type: none"><li>- Three examination during the academic semester = 36%.</li><li>- Assignments = (4%).</li></ul> <p><b>Second: (60%)</b> of the mark is based on final examination that is comprehensive for the whole of the study materials reviewed during the academic semester.</p> |
| <b>Work load:</b>          | <p>The workload is 135 hrs. It is the result of 45 hrs. attendance and 90 hrs. self-studies (Assignments, preparation for exam and applications).</p>   |