

<b>Date:</b>	Examination No.: 2	Version:2023-2024	Start:7/1/2024
<b>Module Name - Code</b>	Navigation Systems - Elective		
<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>	1- The student knew the concept of the navigation. 2- The student learns the principle of orientation according to different norths. 3- The student knew the main types of the reference north. 4- The student learns the principle of the direction transformations. 5- The student learns the main frames used for navigation. 6- The student learns the principle of marine navigation. 7- The student learns the principle of INS & GPS integration.		
<b>Course Content:</b>	<ul style="list-style-type: none"> <li>- Introduction &amp; reference north.</li> <li>- Types of reference north.</li> <li>- Transformation of the directions.</li> <li>- Principle of navigation using compass.</li> <li>- Concept of Reference surfaces.</li> <li>- Frames and datums.</li> <li>- Concept of transformation between different frames.</li> <li>- Principle of navigation using GNSS observations.</li> <li>- Concept of INS systems.</li> <li>- Integration between GPS &amp; INS.</li> <li>- Principle of marine navigation.</li> <li>- Radio system for marine navigation.</li> <li>- Space navigation.</li> </ul>		
<b>Literature:</b>	<ul style="list-style-type: none"> <li>- Higher Surveying by Dr Chandra.</li> <li>- Ghilani C. D. &amp; P. R. Wolf. 2006. Adjustment computations: spatial data analysis.</li> <li>- Surveying Theory and practice. By Raymond E. Davis. Francis S. Foote.</li> <li>- Elementary surveying an introduction to geomatics. By Charles D. Ghilani &amp; Paul R wolf.</li> <li>- Linear Algebra, Geodesy, and GPS. By Gilbert Strang and Kai Borre. 1997.</li> </ul>		
<b>Type of Teaching:</b>	2 hrs. in lectures		
<b>Pre-requisites:</b>	None		
<b>Preparation Modules:</b>	Global geodesy.		
<b>Frequency:</b>	Spring Semester.		

<b>Requirements for credit points:</b>	For the award of credit points, it is necessary to pass the module exam. It contains: Three examination during the academic semester, Assignments and Final examination. Student's attendance is required in all classes.
<b>Credit point:</b>	5
<b>Grade Distribution:</b>	The following grade system is used for the evaluation of the module exam: The module exam is based on the summation of two categories of evaluations: First: (40%) of the mark is based on the academic semester effort which includes - Two exams during the academic semester = 30%. - Quizzes and Assignments = (10%). Second: (60%) of the mark is based on final examination that is comprehensive for the whole of the study materials reviewed during the academic semester.
<b>Workload:</b>	The workload is 135 hrs. It is the result of 45 hrs. attendance and 90 hrs. self-studies (Assignments, preparation for exam and applications).