Course name	Course code	Contact Hours			Year	Level	Prerequisite
		Lectures	Sec/Lab	Credit Hours			
Analytical Mechanics	**363MATH**	**3**	**-**	**3**	**3**	**6**	**362 MATH**

Student's workload				
In-class activities	**Contact Hours**		**Self-learning/study**	**Hours**
Lectures	45		HW/Assignments	22
Laboratory			Study for exam	62
Exams and quizzes	5		Working for lab	
			Preparation for classes	30
Total	**50 ~42**		Total	**114**
Total Learning Hours **= 156**			Equivalent **ECTS points** = Total LH/28 = **5.57**	

(1) Brief Course Description

Analytical Mechanics is an important course in Mathematics, studying this course enables the student to study motion of particles and rigid bodies, chosen coordinates, cyclic coordinates, canonical transformations and study applications depending on Hamilton's principle.

(2) Course Objectives

- Importance of analytical mechanics in branches of science and engineering
- To describe & study motion of particles and rigid bodies in chosen coordinates and cyclic coordinates, canonical transformations and study applications depending on Hamilton's principle
- To accustome the student to think logically and to gain necessary proper skills to resolve issues

(3) Course Contents

- **Generalized Coordinates**: Conservative and non-conservative groups, constraints of power, employment and the amount of motion in generalized coordinates - the principle of Drop (the amount of linear motion, angular momentum, total energy).
- **Lagrange's Method and Applications**.
- **Hamilton's Method :** Hamilton's principle, principle equation, Jacobi equation and their use in solving the harmonic oscillator, variability of the principles and the principle of minimum action.
- **Canonical Transformations Generating Functions**: Poisson brackets and using moments in relationships.

(4) Assessment Criteria

- First mid-term exam 20%
- Second mid-term exam 20%
- Quizzes and home work 10%
- Final exam 50%

(5) Course Teaching Strategies

- Academic lectures
- Scientific discussions
- Home work
- Mini-model education
- Assignments to prepare scientific projects

(6) Text Book

- Lecture Notes on Analytical Mechanics, P. Lidstrom, Div. of Mechanics. Lund University, 2007.

(7) Reference Books

-Goldstein, Poole & Safko: Classical Mechanics. 3rd ed. Addison Wesley, 2002.
- "Analytical Dynamics" Haim Baruh, Pub. McGraw Hill 1998.
- "Analytical Mechanics" Grant R. Fowles, Pub. Brace Publisher Harcount, 1995.
- "Analytical Mechanics" Ismail Hassanein, Abu al-Nur Abdullah, Alrashed Library, 2005.