

ANNEX 2 – COURSE DESCRIPTION

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| Course Title | Machine Elements and Analysis II | | | |
| Course Code | AU309 | | | |
| Course Type | Compulsory | | | |
| Level | BSc (Level 1) | | | |
| Year / Semester | 3 rd Year / 6 th Semester | | | |
| Teacher's Name | Dr. Antonios Lontos | | | |
| ECTS | 6 | Lectures / week | 3 | Laboratories/week 1 |
| Course Purpose | The purpose of the course is to learn how calculate various machine elements using established procedures, select machines elements from a wide variety of libraries and finally how to design real engineering mechanisms or machines. | | | |
| Learning Outcomes | <p>By the end of the course, students must be able to:</p> <ol style="list-style-type: none"> 1. Design and calculate gears. Calculate forces on gears. 2. Design and calculate spur and helical gears. 3. Design and calculate bevel and worm gears. 4. Design and calculate mechanical springs (load, stresses, selection of material). Apply mechanical springs on machines and engineering mechanisms. 5. Calculate clutches and brakes. 6. Calculate and design power transition systems using belts. 7. Calculate roller chains, wire ropes, flexible shafts. | | | |
| Prerequisites | AU308 | Corequisites | None | |
| Course Content | <ul style="list-style-type: none"> • Various types of Gear: – General, Introduction to gears, Types of gears, Tooth system, Contact ratio, Force analysis, Applications of gear design and power transmission in mechanical drives. • Spur and Helical Gears: Calculations, Force analysis, stresses, strains, geometry, applications, drawings. • Bevel and Worm Gears: Calculations, Force analysis, stresses, geometry, applications. • Mechanical Spring: Various types and applications of springs, Stresses in helical springs, Deflection of helical springs, Extension and Compression springs, Springs material, Fatigue loading, Design of springs, Miscellaneous springs. • Clutches and Breaks Brake: Geometry and operations analysis, Band-type clutches and brakes, Energy consideration, Temperature rise, Friction materials. • Power transmission components: Competition of the design of a power transmission, Flat belts, Roller chain, Wire rope, Flexible shaft. | | | |

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| | <ul style="list-style-type: none"> Laboratory work: Use of special software for calculating and drawing of various machine element (Autocad, 3D Drawings, Advanced assembly, SolidWorks, Simple Drawings and FEM Simulations, Software for machine elements calculations) |
| Teaching Methodology | Lectures, laboratories and tutorials are used in this subject and assignments are performed to evaluate the students understanding of the subject matter. A description is given at the beginning of the course in order for the students to get enough information on the main subjects of the course |
| Bibliography | <p>(a) <u>Textbooks:</u></p> <ul style="list-style-type: none"> Fundamentals of Machine Elements, B. J. Hamrock, B. Jacobson, S. R. Schmid, Mcgraw-Hill <p>(b) <u>References:</u></p> <ul style="list-style-type: none"> Mechanical Engineering Design, Ch. R. Mischke, J. Edward Shigley, McGraw-Hill Mechanical Design, An Integrated Approach, Ansel C. Ugural, Mcgraw Hill, 2004. Design of Machine Elements and Machines, Jack A. Collins, George H. Staab, Henry R. Busby, John Wiley & Sons, 2002 Mechanisms and mechanical devices by Neil Clater, Nichocals P. Chironis, Third Edition 2001 Fundamental of Machines Components Design, Robert C. Juvinall, Kurt M. Marshek, Third Edition, 2000 Machine Design: An Integrated Approach by Robert L. Norton, Robert L Norton, Prentice Hall, 2nd edition, 2000 Machine Elements in Mechanical Design by Robert L. Mott, Prentice Hall, 3rd edition, 1998 |
| Assessment | <p>The assessment consists of following methods for both the theoretical and practical part of the course. Each assessment method is assigned with a weight which is used for the calculation of the final grade.</p> <p style="text-align: center;">Assignments: 40% Final Exam: 60%</p> |
| Language | English |