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| Course Name [科目名] | Mechanical Component Design |
| Instructor Name [教員] | IKEDA, Koji |
| Course Structure [授業形態] | Lecture and Exercise |
| Course Credits [単位数] | 3 |
| Course Overview [概要] | This course is designed to give students knowledge of the designer's needs in order to effectively help. The knowledge is about the role of each mechanical component, the required aspects, and the points to be considered for proper design. Students will be also exposed into the actual manufacturing process through short videos. Based on these basic knowledge, stress-stain analysis method will be introduced as general treatment. In this course, widely used and important mechanical components are focused, such as threads, gears, shafts, belts, brakes, dumpers, and bearings. Lubricants are also referred. As genera theoretical analysis method, Airy's stress function is introduced with a case study. As a proof of knowledge achievement, task report is requested at the end of the semester. |
| Course Key Words [キーワード] | Machine element, materials, bolts, shaft, shaft coupling, bearings, lubrication, gears, welding, stress function |
| Academic Goal [目標] | By the end of the course, students should be able to:  1) classify properties of materials and materials for engineering use,  2) analyze and synthesis engineering knowledge in design of engineering devices,  3) convey the analysis results not only to team members but also to instructors,  4) presenting the idea of project based on specific case study. |
| Course Schedule [授業内容] | Class-1: Introduction of mechanical design  1) basic functions of machines and significance of design  2) basic knowledge of machinery (mathematical expression, pulley and lever)  Class-2&3: Basic knowledge for service condition and endurance  1) definition of stress and strain, stress-strain curve, and bending of beam  2) differences between elastic deformation and plastic deformation  Class-4&5: Threads  1) introduction of threads (mechanisms and variations)  2) selection and consideration of threads  Class-6-8: Gears  1) introduction of gears (mechanisms and variations)  2) physical characteristics of contact point and rotation ratio  3) gear face profiles (involute curve and cycloid curves)  Class-9: Mid test for the topics between class-1 and class-8  Class-10: Shafts, Shaft couplings, Keys and Belts  1) introduction of joints  2) selection and consideration of joints  Class-11-13: Belts, Brakes and Dumpers  1) introduction of Belts, Brakes and Dumpers  2) selection of Belts, Brakes and Dumpers  Class-14&15: Bearings  1) introduction of bearing  2) life and consideration of bearings  Class-16-18: Fatigue  1) introduction of fatigue  2) life prediction of fatigue  Class-19-21: Stress function  1) Introduction of stress function  2) typical stress function and their fields  Class-22: Final test for the topics between Class-10 and Class-21 |
| Textbooks, References,  and Supplementary Materials  [テキスト、参考書、その他] | Reference materials will be available by downloading prior each class |
| Grading Philosophy  (Percentage / Criteria / Methodology)  [成績評価の方法] | 1) mini-test and contribution at each class (40%)  2) mid test (30%)  3) final test (30%) |
| Other  (i.e. Expectations on Classroom  Conduct and Decorum etc.)  [その他] | (none) |