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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] | Week1: Introduction of mechanical design  1) basic functions of machines and significance of design  2) basic knowledge of machinery (mathematical expression, pulley and lever)  Week2: Basic knowledge for service condition and endurance  1) definition of stress and strain, stress-strain curve, and bending of beam  2) fatigue behavior, and fatigue life prediction  Week3: Threads  1) introduction of threads  2) selection and consideration of threads  Week4: Gears  1) introduction of gears  2) selection and consideration of gears  Week5: Shafts, Shaft coupling, and Belts  1) introduction of shafts, shaft couplings, and belts  2) selection and consideration of shafts, shaft couplings, and belts  Week6: Lubricants  1) introduction of lubricants  2) selection consideration of lubricants  Week7: Brakes and Dumpers  1) introduction of brakes and dumpers  2) selection and consideration of brakes and dumpers  Week8: Bearings  1) introduction of bearing  2) selection and consideration of bearings  Week9: Introduction for stress function  1) stress function derived from stress equilibrium in orthogonal coordinate system  2) conversion to polar coordinate system  Week10: How to use stress function  1) typical stress function and their fields  2) case study of stress analysis |
| 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 at each class (30%)  2) contribution at each class (30%)  3) final task report (40%) |
| Other  (i.e. Expectations on Classroom  Conduct and Decorum etc.)  [その他] | (none) |