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Lecturer's Information

Name	Dr. Lemma Dendena Tufa (Associate Professor)
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Consultation Hours	Tuesday 10am-12 noon

Course Information

Code and Name	CBEg 6142 Advanced Process Control
Credit Hours	3
Prerequisite	Advanced Computational Methods
Semester	II, March 2020
Course Learning Outcomes(CLO)	**At the end of the course, students should be able to:** 1. Design and Analyze feedback control systems 2. Design and analyze advanced control systems 3. Analyze open-loop and closed-loop characteristics of multivariable systems 4. Design multi-loop controllers with decouplers for multivariable systems
Synopsis	The course starts with introduction of the strengths and weaknesses of the classical feedback control system, gradually setting up the scenario for the need of advanced control systems, like cascade control, feedforward control, multi-loop control systems etc. The course covers design and analysis of advanced control systems. The performance of specific design of control systems will be assessed using simulation software, like Matlab and/or Hysis.
Assessment	The course marks are divided equally between coursework and final exam: Course work • Assignments ……..10% • Project………………...20 % • Test…………………….20% • Final Exam ………….50%

Class Topics	1. **Revision of Feedback Control Systems**
	     1.1 Process Dynamics Modeling
	     1.2 Feedback Control System
	 2. **Selective, Override and Split Range Control**
	 3. **Feed-forward Control**
	 4. **Ratio Control**
	 5. **Cascade Control**
	 6. **Direct Synthesis Control**
	 7. **Internal Model Control**
	 8. **Time Delay Compensation (Smith Predictor)**
	 9. **Multi-loop Control Systems**
	     ▪ Pairing Controlled and Manipulated Variables
	     ▪ Interaction
	     ▪ Decoupling and Decoupler Design

Main References	Seborg D.E., Edgar T. F. and Mellichamp D. A., Process Dynamics and Control, 2nd Ed., John Wiley, 2004. Cecil L. Smith, ADVANCED PROCESS CONTROL, Beyond Single-Loop Control
Optional References	Automated Continuous Process Contro1, **Carlos A. Smith,** 2002, John Wiley & Sons, Inc., New York B. Roffel . B. H.Betlem, Advanced Practical Process Control**,** 2004, Springer-Veriag Harold L. Wade, Basic and Advanced Regulatory Control: System Design and Application, 2nd edition, 2004, ISA.