Course name	**ECE 52702 Advanced Power Electronics Converters**
Credit and contact hours	(3 cr.) Class 3
Course coordinator's name	Euzeli Dos Santos
Textbook	E. C. dos Santos, E. R. da Silva, *Advanced Power Electronics Converters: PWM Converters Processing AC Voltage*, Wiley 2014, ISBN 9781118880944, 384 pages, Wiley-IEEE Press
Course information	ECE 52702 Advanced Power Electronics Converters (3 cr.) P: ECE 20200, ECE 42700 Class 3. This course introduces students to advanced power electronics converters dealing with ac voltage. The power electronics topologies considered in this course are sorted into two groups: a) neutral-point-clamped, b) cascase, c) flying capacitor, and d) non-conventional multilevel configurations. The back-to-back converters presented are: a) three-phase to three-phase, b) single-phase to three-phase, c) single-phase to single-phase ac-dc-ac converters. A new methodology will be employed to present comprehensively multilevel and back-to-back converters topologies. The main applications of those converters are in renewable energy systems, active power filters, energy efficiency devices and motor drive systems. **Prerequisites/ Co-Requisite** ECE 20200 and ECE 42700 or graduate standing **Required, Elective, or Selected Elective:** EE Elective, CE Elective
Goals for the course	Upon successful completion of the course, students should be able to 1. Describe the operation of the main multi-level and ac-dc-ac converters. [1, 2,6] 2. Develop PWM and linear control for multi-level and ac-dc-ac converters. [1, 2, 1,6] 3. Design and specify multi-level and back-to-back converters. [1, 2,1, 6] 4. Develop non-conventional power electronics topologies for applications in renewable energy systems and power quality device. [1, 1, 2,6]
6List of topics to be covered	1. Introduction, History, Trends, and Applications of power converters 2. Power Devices and basic power converters 3. Introduction to PBG (Power-Block-Geometry) methodology 4. Application of PBG in Multilevel Configurations 5. Neutral-Point-Clamped Configuration 6. Cascade Configuration 7. Flying Capacitor Configuration 8. Non-Conventional Multilevel Configurations 9. Students' Seminar 10. Application of PBG in ac-dc-ac Configuration

	11. PWM and Feedback Control Strategies 12. Three-phase to Three-phase Configuration 13. Single-phase to Three-phase Configuration 14. Single-phase to Single-phase Configuration 15. Applications of multilevel converters in renewable energy system 16. Dc-ac and ac-dc Converters 17. Applications of ac-dc-ac converters in power quality devices (active power filters) 18. Students' Project
Syllabi approved by	Euzeli Dos Santos
Date of approval	12/03/2021