Indian Institute of Technology Guwahati
Proposal for a New Course / Revision of a Course

Course Number & Title: EN680 - Distributed Energy Resources in Electric Grid	
L-T-P-C: 3-0-0-6	
Type of Letter Grading (Regular Letter Grades / PP or NP Letter Grades): Regular letter grades	
Kind of Proposal (New Course / Revision of Existing Course): New Course	
Offered as (Compulsory / Elective): Elective for MS by research in Energy	
Offered to: Master of Science by Research (M.S.-R) in Energy	
Offered in (Odd/ Even / Any): Odd	
Offered by (Name of Department/ Center): School of Energy Science & Engineering	
Pre-Requisite: None	
Preamble / Objectives (Optional): This course provides an introduction to Distributed Energy Resources (DER) in the electrical grid and the standards that inform DER deployment. The course requires no prior knowledge of the topic and is intended for students who are interested in exploring technical, professional, and operational careers in the rapidly growing distributed energy industry. Students will acquire a foundation in the basic electrical concepts that are needed to understand the more detailed considerations associated with DER in the grid. Furthermore, the course will also provide detailed insights into topics concerning DER interconnection standards and regulations, DER networking standards like IEEE 2030.5, and cybersecurity. Moreover, key DER technologies such as solar, wind, energy storage, and electric vehicles are also covered in more depth.	
Course Content/ Syllabus: Energy and electricity overview, usage, trends, generation, usage concepts, electricity fundamentals; Electrical grids, overview, large electrical grids, smaller electrical grids, microgrids; Distributed energy resources, overview, grid interconnection; Photovoltaic (Solar) generation, technology overview and effects on grid; Wind generation, technology overview and effects on grid; Energy storage, technology overview and effects on grid; Electric vehicles, technology overview and effects on grid; IEEE 1547, functionality, role in DER development and grid regulations; DER networking and communications, DER communication overview, IEEE 2030.5, SunSpec Modbus, IEEE 1815 (DNP3), IEC 61850-7-420; Grid security, overview with an emphasis on security associated with communications network used to interface with DER.	
Books (In case UG compulsory courses, please give it as “Text books” and “Reference books”. Otherwise give it as “References”.	
Texts: (Format: Authors, *Book Title in Italics font,* Volume/Series, Edition Number, Publisher, Year.)	
1.	Math HJ Bollen, and Hassan Fainan, *Integration of distributed generation in the power system*, Vol. 80. John Wiley & Sons, 2011.
2.	Janaka Ekanayake et al, *Smart Grid: Technology and Applications*, 2nd ed., Wiley, 2012.
References: (Format: Authors, *Book Title in Italics font,* Volume/Series, Edition Number, Publisher, Year.)	
1.	James Kirtley, *Electric Power Principles: Sources, Conversion, Distribution and Use*. Wiley, 2010. ISBN: 9780470686362.
2.	James Momh, *Smart Grid: Fundamentals of Design and Analysis*, International Edition, Wiley, 2012. ISBN: 978-1-118-15610-0

Detailed Course Content (Optional) It will not be included in the Courses of Study Booklet		
Sl. No.	Broad Title / Topics	Number of Lectures
1		
2		
3		
4		
5		
	Total Number of Lectures =	

In case of revision of existing course, Please provide below the details of existing course. **EXISTING COURSE**
Course Number, Title, L-T-P-C: NA
Pre-Requisite (if any): NA
Contents: NA
References: NA