

**DEPARTMENT OF COMPUTER APPLICATIONS**  
**NATIONAL INSTITUTE OF TECHNOLOGY, TIRUCHIRAPPALLI**

<b>COURSE PLAN – PART I</b>			
<b>Name of the programme and specialization</b>	<b>Master of Computer Applications</b>		
<b>Course Title</b>	<b>Green Computing</b>		
<b>Course Code</b>	<b>CA7B1</b>	<b>No. of Credits</b>	<b>3</b>
<b>Course Code of Pre-requisite subject(s)</b>	<b>CA715, CA731</b>		
<b>Session</b>	<b>July 2021</b>	<b>Section (If applicable)</b>	<b>A-and B</b>
<b>Name of Faculty</b>	<b>Dr. Ghanshyam S. Bopche</b>	<b>Department</b>	<b>Computer Applications</b>
<b>Email</b>	<b>bopche@nitt.edu</b>	<b>Telephone No.</b>	<b>0431-2503735</b>
<b>Name of PAC Chairman</b>	<b>Dr. U.Srinivasulu Reddy</b>		
<b>E-mail</b>	<b>usreddy@nitt.edu</b>	<b>Telephone No.</b>	<b>0431-2503746</b>
<b>Course Type</b>	<b>Elective course</b>		
<b>Syllabus (approved in BoS)</b>			
<p>Importance of Green IT, The Growing Significance of Green IT and Green Data Centers, All Basic Steps towards Green IT, The Basics of Green IT.</p> <p>Collaboration is Key for Green IT, The Government’s Role, Regulation and EPA Activity, Regulating Greenhouse Gases, Role of the EPA, IT Company Support of Government Regulation, Educational Institutions and Government Regulation.</p> <p>Magic of Incentive, The Role of Electric Utilities, A Most-Significant Step - "Virtualizing" IT Systems, Consolidation and Virtualization, Data Storage.</p> <p>Need for Standard IT Energy-Use Metrics: SPEC -EPA- LEED, Green Grid Data Center Power Efficiency Metrics: PUE and DciE, Data Center: Strategies for Increasing Data Center -Cooling Efficiency, Fuel Cells for Data Center Electricity, Emerging Technologies for Data Centers.</p> <p>IT Case Studies for Energy Utilities, Green IT Case Studies for Universities and a Large Company, Worldwide Green IT Case Studies, The Future of Green IT for Corporations.</p>			

**REFERENCES:**

1. John Lamb, "The Greening of IT-How Companies Can Make a Difference for the Environment", IBM Press 2009
2. Frederic P. Miller, Agnes F. Vandome, John McBrewster, "Green Computing", Alpha script publishing.

**COURSE OBJECTIVE(S)**

To introduce green computing in the ICT environments




**COURSE OUTCOMES (CO)**

<b>Course Outcomes</b>	<b>Aligned Programme Outcomes (PO)</b>
Students will be able to:	
1. Deduce the need and basics of Green IT.	<b>PO I, II, III, IV, V</b>
2. Compare the collaborative effort of various agencies for the effectiveness of the Green IT.	<b>PO I, II, III, IV, V</b>
3. State the need for virtualization and its impact.	<b>PO I, II, III, IV, V</b>
4. List and categorize various IT energy-use metrics.	<b>PO I, II, III, IV, V</b>
5. Use Green IT in various areas and the future needs and trends.	<b>PO I, II, III, IV, V</b>

**COURSE PLAN – PART II****COURSE OVERVIEW**

This course covers topics on importance of Green IT, Green Data Centers, basics of Green IT, important steps towards Green IT, collaboration, Government's roles and regulations, regulation of greenhouse gases, role of the Environmental Protection Agency (EPA), IT company support for government greenhouse regulations, roles of educational institutions, role of electric utilities, role of incentives, virtualization of IT systems, server consolidation, data storage virtualization, need of metrics to assess energy efficiency, SPEC, LEED, data center power efficiency metrics: PUE, DCiE, data center strategies for increasing cooling efficiency, fuel cells, emerging technologies for data center, Green IT case studies for: energy utilities, universities, and large companies, future of Green IT and corporations.

<b>COURSE TEACHING AND LEARNING ACTIVITIES</b>			
<b>S. No.</b>	<b>Week/ Contact Hours</b>	<b>Topic</b>	<b>Mode of Delivery</b>
1	Week 1 (3 Classes)	Importance of Green IT, The Growing Significance of Green IT and Green Data Centers.	Online Class, Power Point Presentation
2	Week 2 (3 Classes)	The Basics of Green IT, All Basic Steps towards Green IT.	Online Class, Power Point Presentation
3	Week 3 (3 Classes)	Collaboration is Key for Green IT, The Government's Role, Regulation and EPA Activity, Regulating Greenhouse Gases.	Online Class, Power Point Presentation
4	Week 4 (3 Classes)	Role of the EPA, IT Company Support of Government Regulation, Educational Institutions and Government Regulation.	Online Class, Power Point Presentation
5	Week 5 (3 Classes)	Magic of Incentive.	Online Class, Power Point Presentation
6	Week 6 (3 Classes)	The Role of Electric Utilities.	Online Class, Power Point Presentation
7	Week 7 (3 Classes)	A Most-Significant Step - "Virtualizing" IT Systems.	Online Class, Power Point Presentation
8	Week 8 (3 Classes)	Consolidation and Virtualization - Data Storage.	Online Class, Power Point Presentation
9	Week 9 (3 Classes)	Need for Standard IT Energy-Use Metrics: SPEC - EPA- LEED.	Online Class, Power Point Presentation
10	Week 10 (3 Classes)	Green Grid Data Center Power Efficiency Metrics: PUE and DciE .	Online Class, Power Point Presentation
11	Week 11 (3 Classes)	Data Center, Strategies for Increasing Data Center Cooling Efficiency, Fuel Cells for Data Center Electricity, Emerging Technologies for Data Centers.	Online Class, Power Point Presentation
12	Week 12 (3 Classes)	Green IT Case Studies for Energy Utilities.	Online Class, Power Point Presentation
13	Week 13 (3 Classes)	Green IT Case Studies for Universities and a Large Company.	Online Class, Power Point Presentation
14	Week 14 (3 Classes)	Worldwide Green IT - Case Studies, The Future of Green IT for Corporations.	Online Class, Power Point Presentation

<b>COURSE ASSESSMENT METHODS</b>				
<b>S. No.</b>	<b>Mode of Assessment</b>	<b>Week/Date</b>	<b>Duration</b>	<b>% Weightage</b>
1	Cycle Test 1 (Platform: Google Classroom/Canvas)	6 <sup>th</sup> Week	40 Minutes	20 (Quiz)
2	Cycle Test 2 (Platform: Google Classroom/Canvas)	10 <sup>th</sup> Week	40 Minutes	20 (Quiz)
3	Assignment 1	7 <sup>th</sup> week	-	15 (Quiz)
4	Assignment 2	11 <sup>th</sup> week	-	15 (Quiz)
5	Compensation Assessment (Platform: Google Classroom/Canvas)	14 <sup>th</sup> Week	40 Minutes	20 (Quiz)
6	Final Assessment	-	90 Minutes	30 (Descriptive)
<p><b><u>ATTENDANCE POLICY</u></b> (A uniform attendance policy as specified below shall be followed)</p> <ul style="list-style-type: none"> <li>➤ <b>At least 75% attendance in each course is mandatory.</b></li> <li>➤ <b>A maximum of 10% shall be allowed in case of issues such as network connectivity, power cut, etc.</b></li> <li>➤ Students with <b>less than 65% of attendance</b> shall be prevented from writing the final assessment and <b>shall be awarded 'V' grade.</b></li> </ul>				
<p><b><u>ACADEMIC DISHONESTY &amp; PLAGIARISM</u></b></p> <ul style="list-style-type: none"> <li>➤ Talking to other students/person over a phone during the online exam/assessment will be treated as punishable dishonesty.</li> <li>➤ Zero mark to be awarded for the offenders.</li> <li>➤ The departmental disciplinary committee including the course faculty member, PAC chairperson and the HoD, as members shall verify the facts of the malpractice and award the punishment if the student is found guilty. The report shall be submitted to the Academic office.</li> </ul> <p>The above policy against academic dishonesty shall be applicable for all the programmes.</p>				
<b>ADDITIONAL INFORMATION</b>				
<b>NIL</b>				
<b>FOR APPROVAL</b>				
<div style="display: flex; justify-content: space-between; align-items: flex-end;"> <div style="text-align: center;">   <b>Course Faculty</b>  <b>(Dr. Ghanshyam Bopche)</b> </div> <div style="text-align: center;">   <b>PAC Chairperson</b>  <b>(Dr. U.Srinivasulu Reddy)</b> </div> <div style="text-align: center;">   <b>HOD</b>  <b>(Dr. P.J.A Alphonse)</b> </div> </div>				