AICTE Model CSE Curriculum Revision

Pankaj Jalote
AICTE CSE Curriculum Revision

• AICTE appointed P. Jalote as Chair of the committee to revise the curriculum
  • In May 2021; CSEDU was already in advanced stages of planning with expert groups for most of the subjects
• This opened an opportunity – the experts for different subjects can design the curriculum and then train the teachers on how to teach it
  • Requested CSEDU expert groups for syllabus revision of courses (formed new groups for other courses)
• Curriculum development is a separate activity with a different goal – but many common experts
  • https://iiitd.ac.in/aictecse
## AICTE Committee (Extended)

- Pankaj Jalote (Chair)
- Manoj Singh Gaur, IIT Jammu
- Nutan Limaye, IIT Bombay
- Ramkumar, Pro VC, Krea University
- Dheeraj Sanghi, VC, JKLU
- NASSCOM rep
- RBV Subramanyam, NIT Warangal
- Sanjiva Prasad, IIT Delhi
- Venkatesh R, TCS Pune
- Viraj Kumar, ACM India Education Committee
- Vishram Thatte, Amazon India
- Vinnie Jauhari, Microsoft India
- R Latha, IBM India
- Gaurav Aggarwal, Google India
- Vinayaka Ram Gururajan, TCS
- Thirumala and Sundar K S, Infosys
- P.B. Kotur, Wipro
- Ishvinder Singh, Cisco Systems, Inc.
- Rahul Suresh Ghali, accenture
- Kishore Kothapalli, IIIT Hyderabad
- Sudeshna Sarkar, IIT Karaghpur
- Sukumar Nandi, IIT Gauhati
- Suchismita Roy, NIT Durgapur
- Ashalatha Nayak, Manipal Institute of Technology
Scope

• The primary target audience of curriculum will be Tier II/III institutes, i.e. the vast majority, rather than the top institutions

• The goal is to help improve CS education in these

• The committee may also suggest:
  • Some Maths courses, and electives in humanities and social science to support CS education
  • How online resources can be leveraged
  • Approaches for assessment and teaching
  • Some "outside the curriculum" activities (e.g. clubs, hackathons, etc.) to support student learning
Approach

- **Provide flexibility.** Even within the large Tier II/III, some have more capability than others; one curriculum cannot fit the needs of all institutions
  - For each course, the learning outcomes will be grouped in two – essential, and desired/advanced.
  - The core courses will be identified as essential and desired/advanced.

- **Multiple Pathways.** For supporting specializations, honors for advanced students, advanced learning, etc

- **Multiple Exits.** Develop skills early, and not take the theory-first approach
  - Eliminate separation of theory and labs – both should be taught together in an integrated manner.
  - Introduce discipline courses early, so disciplinary skills can be developed early
Graduate Attributes (CSE)

- Proficiency in writing in at least two dissimilar programming languages programs of modest complexity which are: readable, tested for correctness, efficient, and secure
- Ability to design and apply appropriate algorithms and data structures for evolving efficient computing based solutions for new problems
- Understanding of computing systems at computer architecture, operating systems, and distributed-computing levels, and how they affect the performance of software applications
- Understanding of theoretical foundations, fundamental principles, and limits of computing
- Ability to analyse large volumes of data employing a variety of techniques for learning, better prediction, decision making, etc.
Graduate Attributes (CSE)...

• Ability to design, implement, and evaluate computer based system or application to meet the desired needs using modern tools and methodologies

• Ability to develop full stack applications using one commonly used tech-stack and modern tools

• Understanding of and ability to use advanced techniques and tools in a few different domain areas (e.g. parallel processing, image processing, IR, ...)

• Exposure to emerging technologies such as Cloud Computing, IoT, etc
<table>
<thead>
<tr>
<th>Year</th>
<th>Course</th>
</tr>
</thead>
<tbody>
<tr>
<td>2nd year</td>
<td>Data structures and Algorithms</td>
</tr>
<tr>
<td>2nd year</td>
<td>Discrete Mathematics</td>
</tr>
<tr>
<td>2nd year</td>
<td>Computer Organization and Architecture</td>
</tr>
<tr>
<td>2nd year</td>
<td>Advanced Programming (in lieu of OO programming)</td>
</tr>
<tr>
<td>3rd year</td>
<td>Operating Systems</td>
</tr>
<tr>
<td>3rd year</td>
<td>Design and Analysis of Algorithms</td>
</tr>
<tr>
<td>3rd year</td>
<td>Database Systems</td>
</tr>
<tr>
<td>3rd/4th year</td>
<td>Computer Networks</td>
</tr>
<tr>
<td>3rd year</td>
<td>Machine Learning (New)</td>
</tr>
<tr>
<td>3rd year</td>
<td>Security (New)</td>
</tr>
</tbody>
</table>
### Extended Core / Electives

<table>
<thead>
<tr>
<th></th>
<th>Extended Professional Core (Desirable)</th>
</tr>
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<tbody>
<tr>
<td>3(^{rd}/4^{th}) year</td>
<td>Compiler Design</td>
</tr>
<tr>
<td>3(^{rd}/4^{th}) year</td>
<td>Formal Languages and Automata Theory</td>
</tr>
<tr>
<td></td>
<td>Highly Desirable Electives</td>
</tr>
<tr>
<td>3(^{rd}/4^{th}) year</td>
<td>Software Engineering using Open Source</td>
</tr>
<tr>
<td>3(^{rd}/4^{th}) year</td>
<td>Distributed computing / Cloud Computing</td>
</tr>
</tbody>
</table>
Template for Course Design

- Learning Outcomes of the course
  - Essential (<=6)
  - Desirable/Advanced (<= 3)

- Syllabus is a table giving
  - Module and its duration
  - Topics in the module
  - Pedagogy suggestions for the module
  - Nature of lab / assignment

- Suggested text book

- Suggested online resources

- Suggested reference books

...
Summary

• Curriculum revision is ongoing – should conclude in a few months
• Curriculum recommendations are complete in themselves and stand alone
• Is used as basis of “what to teach” in CSEDU
• Expert groups defining the syllabus for each course

• URL: https://iiitd.ac.in/aictecse