The undergraduate program in Chemical Engineering

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An engineering graduate

Educational Objectives (for all graduates)

- graduates to become **innovative, competent, contributing engineers** in the **process industries**
- graduates to demonstrate their **flexibility and adaptability** in the workplace, so that they **remain effective engineers**, take on **new responsibilities**, and assume **leadership roles**
- graduates to **continue their education** by obtaining **advanced degrees**

From UCSB

The philosophy

- Enhance the following
  - Interdisciplinary – courses across depts
  - Flexibility
  - Larger number of Electives
  - Motivate/inspire students
  - Encourage self learning
  - Encourage students doing well
  - UG projects/research
  - Earning credits from outside IITK

The product

- Humane, global Indians who are leaders in their field

Overall character of ChE education

- **Fundamentals** –
  - knowledge of **mathematics, computing, science, and engineering** needed to **practice chemical engineering** and the ability to apply this knowledge to **identify, formulate, and solve chemical engineering problem**

- **Laboratory** –
  - the ability to **design and conduct experiments** and to **analyze and interpret data**

- **Design** –
  - ability to **design a system, component, or process** to meet desired specifications; ability to **use modern engineering tools** necessary for engineering practice

And some more

- **Advanced Training** –
  - beyond the basic fundamentals in at least one area of chemical engineering as preparation for a continuing process of lifelong learning

- **Teamwork/Communication** –
  - ability to function productively in multidisciplinary teams working towards common goals; the ability to communicate effectively through written reports and oral presentations

- **Engineering & Society** –
  - the broad education necessary to understand the impact of engineering solutions in a global/societal context; a knowledge of contemporary issues; an understanding of professional and ethical responsibility; a recognition of the need for and the ability to engage in lifelong learning

ChE@IITK$_{2008}$

- “The Department imparts graduate education with emphasis on chemical engineering fundamentals … They are primarily intended to prepare students for teaching and R&D careers …”

IITK

Chemical Engineering program at some IITs

- Courses that are required by all departments
- Advanced courses in Sciences and Engineering that are department specific
- Program subjects
- Electives

Alternatively:

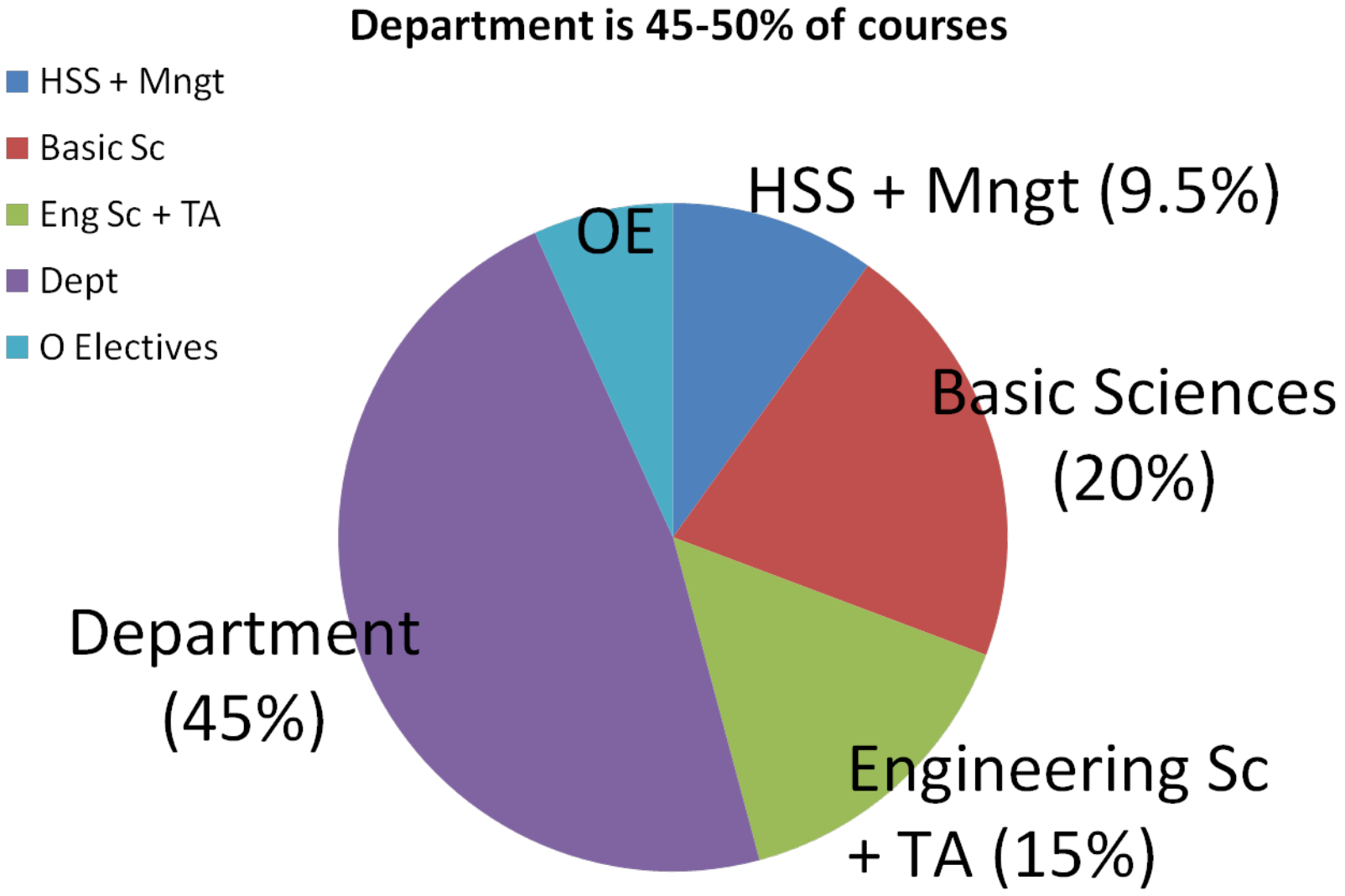
Basic Sciences
Engineering Sciences
Departmental
Humanities

Electives (Open + Dept)
Others (Phy Edu, Mngmt, Foreign Language)

Distribution of courses in some IITs

IIT	HSS & Management	Basic Science	Engineering Sciences + TA	Department	Electives (DE + OE)	Total Dept
BOM	5	30	12	40	16.5 (12.5+4.0)	52.5
DEL	9	11	11	35.5	33 (14+19)	49.5
KNP	14	18.5	17.5	27	23 (9+14)	36
KGP	8	17	15.5	47	12.07	> 47
MAD	7	18.5	11	48	15 (6.5+8.5)	54.5
	5 to 14	11 to 30	11 to 17.5	Last col→	4 to 8.5 (OE)	36 to 55

“Optimum” fraction in IITs



Courses we do in ChE@IIT

- The 1st year
  - Devoted to establishing a Science and Engineering base for future courses (common to several/all disciplines); Humanities also important

  Physics, Chemistry, Mathematics, Computing, HSS, TA, etc.
- Departmental courses
  - Introduction to ChE (IITB, IITD, IITM)
  - Process Calculations (IITM)
  - Transport Phenomena (IITD)
  - None at IITK and IITKGP

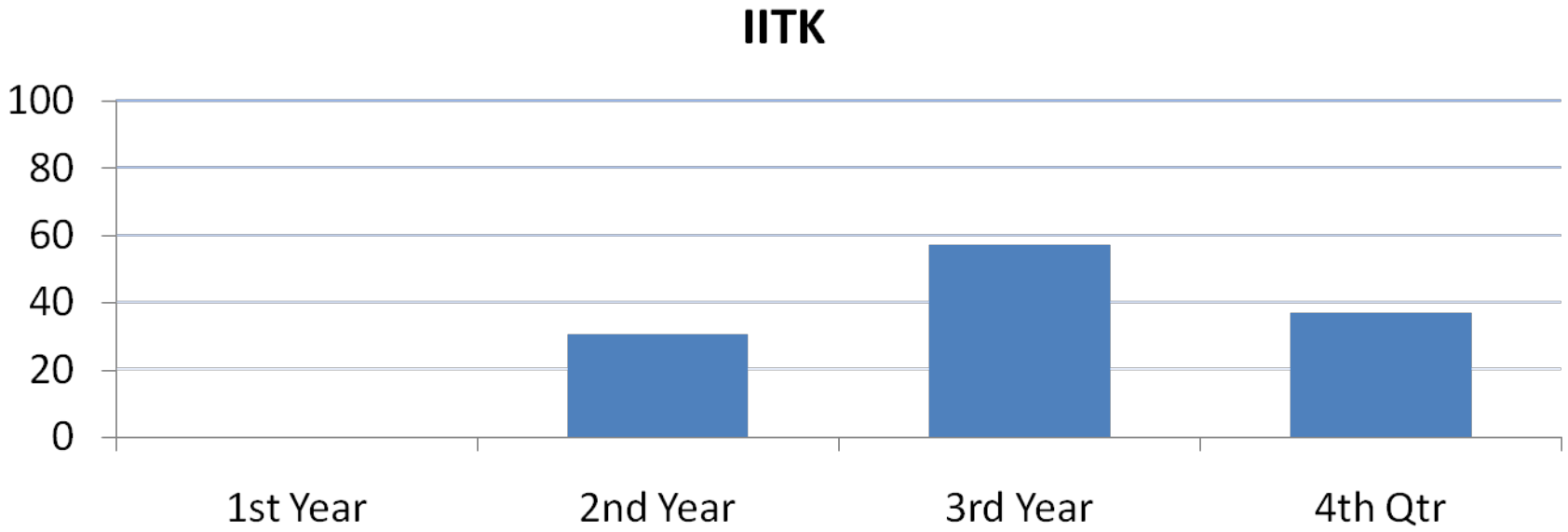
All IITs have several ChE courses in the 2nd Year

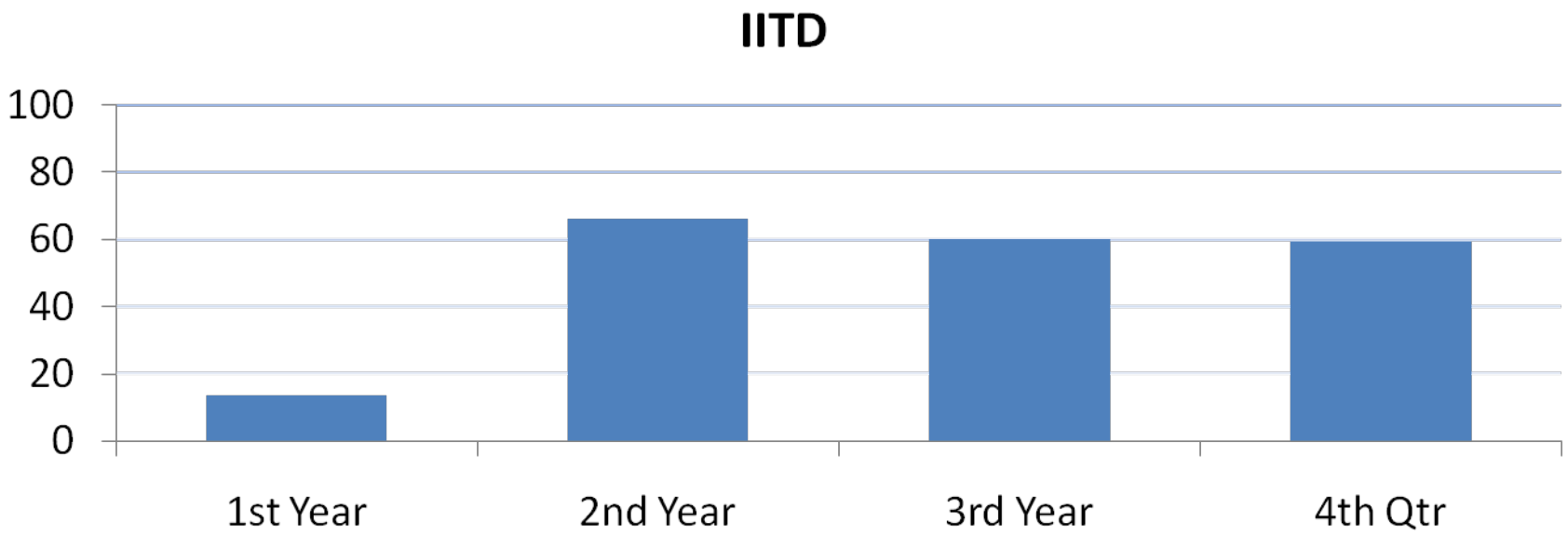
- B (7+1), D(7+2), K(4), KGP(4+2), M(7)
- Process Calculation (K, KGP)
- Chemical Engineering Thermo (All)
- Fluid Mech or similar (All)
- Chemical Process Technology/Industries (K,D,M)
- CRE-I (D)
- Labs - Fluid, HT, Fuels, Design
- Mech Operations (M)

Majority of courses finished by the 3rd year & 4th year for Finishing and Electives

- 3rd year courses include:
  - Transport (HT & MT), Reaction, Process Control, Computer apps and Labs
- 4th year courses include:
  - Design, Projects, Labs and Electives (Dept + Open)
  - Minors and Honors

% Dept courses in the 4 years





Courses that make up ChE

- Process Calculations (along with Intro to ChE?)
- ChE Thermo (1 or 2?)
- Chemical Process Industries (1 or none or with above?)
- HT & MT (Transport Phenomena- 2 or 3?) and Fluids
- Reaction Engineering (2)
- Mechanical operations (?)

- Controls (1)
- Design (1 or 2)
- Projects (1 or 2)

- Labs (2 or 6?)
- Electives (2-4?)