

# The COE Department

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College of Computer Sciences and  
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**Special Talk for Professor Theodre Rickart ABET**

## I n t r o d u c t i o n

- Established in 1986 (started with 4 faculty and about 80 students).
- As we shall see, has seen a steady growth both in number of students and faculty.
- Curricula was designed and evaluated by several colleagues internally, and then reviewed externally.
- Curricula has been made to evolve continuously, university regulations provide a mechanism for that.
- Several distinguished visitors evaluated our curriculum, and we also had one ABET accreditation visit.

# Introduction

- Due to fast rate of growth, several difficult decisions had to be made, such as
  - » Sacrifice of research laboratory space.
  - » Higher student to faculty ratio accepted.
  - » Larger section sizes.
  - » Etc.

# Introduction

- Quality was never compromised at any stage.
- The department is still known to produce the best engineers in the university.
- The faculty is very competent and hardworking (our department has had the honor of getting the excellence in teaching award, and excellence in research award almost every year).

# Goals

- Graduate students in Computer Engineering.
- Provide engineers who are capable of coping with a rapidly growing computer technology.
- Conduct research activities that will enhance the country's industry, and broaden the scope and ability of faculty members.
- Provide necessary channels for transferring computer engineering technology into country.
- Adapt new and appropriate technologies for the country's need.

# Computer Engineering

Computer Engineering (COE) is the discipline concerned with the **design, analysis, modeling and implementation of computers and networks**. Both the software and the hardware aspects of these systems are studied in a balanced and **coherent** manner. The COE program at KFUPM provides a comprehensive coverage of a wide range of COE subjects including **computer networks and data communications, computer programming languages and software, computer architecture and operating systems, hardware design, and microprocessor-based systems.**

# COE Disciplines

- Computer Networks and Data Communications.
- Computer Architecture and Design.
- Digital Design Automation and VLSI.
- Computer Based Systems.
- Testability and Fault Tolerance.

# Computer Engineering Students Study?

## (1) Computer networks design, maintenance, and administration

- Data communications
- Computer networks
- Local area networks
- Internet information Services
- Mobile computing



# Computer Engineering Students Study?

## (2) Programming

- Introduction to computer science
- Data structures
- Operating systems
- Design and analysis of algorithms
- Programming languages

# Computer Engineering Students Study?

## (3) Logic and circuit design

- Computer organization
- Computer architecture
- Electric circuits
- Electronics
- VLSI design

# COE Tracks

☞ COE curriculum has three tracks for students to concentrate. The tracks are:

 Computer Networks

 Computer Systems

 Software

# Resources Available to Students

- Computer Networks Lab & SUN Sparc machines lab,
  - 10 & 100 Mbps Ethernets, ATM switches, CISCO routers and all kinds of relays. The College's main network is also partially available for study and testing
- SUN Sparc machines run tools, such as, VHDL simulators, Spice, Magic, Oasis, (has benchmark), all run on top of SunOS and Solaris
- A number of other labs such as Logic Design Lab, Microprocessors lab, Digital System Design lab and, and PCB Manufacturing Center.

# Software Track

- This track focuses on developing hardware design and systems software.
- Resources available to students:
  - » College PC labs
  - » Resources shared with Computer Science Department

# Last Three Years of the B.Sc. Program

## Third Year (Sophomore)

COE	200	Fundam. of Comp. Eng.	3	3	4	COE	205	Comp. Org. & Ass. Lang.	3	3	4
EE	201	Electric Circuits I	3	3	4	EE	203	Electronics I	3	3	4
ICS	201	Introduction to CS	3	3	4	ICS	202	Data Structures	3	0	3
MATH	201	Calculus III	3	0	3	ICS	252	Discrete Structures	3	0	3
IAS	222	Qur'an and Sunnah	2	0	2	MATH	260	Linear Alg. & Diff. Equ.	3	0	3
						PE	102	Physical Education II	0	2	1
<b>Total</b>			<b>14</b>	<b>9</b>	<b>17</b>				<b>15</b>	<b>8</b>	<b>18</b>

## Fourth Year (Junior)

COE	305	Microcomp. Syst. Design	3	3	4	COE	308	Computer Architecture	3	0	3
COE	342	Data & Computer Comm.	3	0	3	COE	442	Computer Networks	3	3	4
COE	360	Principles of VLSI Desg.	3	0	3	COE	390	Seminar	1	0	1
STAT	319	Prob & Stat. For Eng. & Sc.	2	3	3	ICS	xxx	ICS Elective	3	0	3
ENGL	214	Tech. Report Writing	3	0	3	xxx	xxx	Elective	3	0	3
IAS	300	Arabic Terminology	2	0	2	IAS	333	The Islamic System	2	0	2
<b>Total</b>			<b>16</b>	<b>6</b>	<b>18</b>				<b>15</b>	<b>3</b>	<b>16</b>

COE	399	COE Summer Training	0	0	0						
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## Fifth Year (Senior)

COE	485	Senior Design Project	1	6	3	COE	400	System Design Lab.	1	6	3
COE	4xx	COE Elective	3	0	3	COE	4xx	COE Elective	3	0	3
ICS	431	Operating Systems	3	3	4	COE	4xx	COE Elective	3	0	3
xxx	xxx	Elective	3	0	3	xxx	xxx	Elective	3	0	3
IAS	4xx	IAS Elective	2	0	2	IAS	4xx	IAS Elective	2	0	2
<b>Total</b>			<b>12</b>	<b>9</b>	<b>15</b>				<b>12</b>	<b>6</b>	<b>14</b>

# Last Three Years of the B.Sc. Program (Co-op)

## Third Year (Sophomore)

COE 200	Fundam. of Comp. Eng.	3	3	4	COE 205	Comp. Org & Ass. Lang.	3	3	4
EE 201	Electric Circuits I	3	3	4	EE 203	Electronics I	3	3	4
ICS 201	Introduction to CS	3	3	4	ICS 202	Data Structures	3	0	3
					ICS 252	Discrete Structures	3	0	3
MATH 201	Calculus III	3	0	3	MATH 260	Linear Alg. & Diff. Equ.	3	0	3
IAS 222	Qur'an and Sunnah	2	0	2	PE 102	Physical Education II	0	2	1
<b>Total</b>		<b>14</b>	<b>9</b>	<b>17</b>			<b>15</b>	<b>8</b>	<b>18</b>

## Fourth Year (Junior)

COE 305	Microcomp. Syst. Desgn.	3	3	4	COE 308	Computer Architecture	3	0	3
STAT 319	Prob & Stat. Eng. & Sc.	2	3	3	COE 360	Principles of VLSI Desg.	3	0	3
COE 342	Data & Comp. Comm.	3	0	3	COE 442	Computer Networks	3	3	4
ICS xxx	ICS Elective	3	0	3	IAS 4xx	IAS Elective	2	0	2
ENGL 214	Tech. Report Writing	3	0	3	COE 390	Seminar	1	0	1
					xxx xxx	Elective	3	0	3
IAS 300	Arabic Terminology	2	0	2	IAS 333	The Islamic System	2	0	2
<b>Total</b>		<b>16</b>	<b>6</b>	<b>18</b>			<b>17</b>	<b>3</b>	<b>18</b>

COE 350	Co-operative work	0	0	0					
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## Fifth Year (Senior)

COE 351	Co-op. Work (cont.)	0	0	9	COE 400	System Design Lab.	1	6	3
					COE 4xx	COE Elective	3	0	3
					COE 4xx	COE Elective	3	0	3
					ICS 431	Operating Systems	3	3	4
					xxx xxx	Elective	3	0	3
					IAS 4xx	IAS Elective	2	0	2
<b>Total</b>		<b>0</b>	<b>0</b>	<b>9</b>			<b>15</b>	<b>9</b>	<b>18</b>

# List of Electives

Architecture	COE 401 COE 402 COE 403 COE 405 COE 409 COE 410	RISC Architectures Computer Sys. Performance Evaluation Advanced Microprocessor Architecture Design and Modeling of Digital Systems Special Topics in Comp. Arch. & Dig. Sys. Design Design of Sequential Systems
Parallel Processing	COE 420 COE 421 COE 422 COE 423 COE 429	Parallel Computing Fault-Tolerant Computing Real Time Systems Distributed Systems Special Topics in Parallel and Distributed Systems
Networking	COE 441 COE 443 COE 444 COE 445 COE 446 COE 449	Local Area Networks High Speed Networks Internetwork Design and Management Internet Information Services Mobile Computing Special Topics in Computer Comm. & Net
Electronics & VLSI	COE 460 COE 462 COE 464 COE 465 COE 469	Advanced Digital Electronics Design Automation of VLSI Circuits Testing of Digital Circuits VLSI System Design Methodology Special Topics in VLSI
Other	COE 484 COE 485 COE 487 COE 488	Introduction to Robotics Senior Design Project Computer Vision Processing Data Acquisition Interfacing
	COE 499	Special Topics in Computer Engineering



# ial List of Research Projects

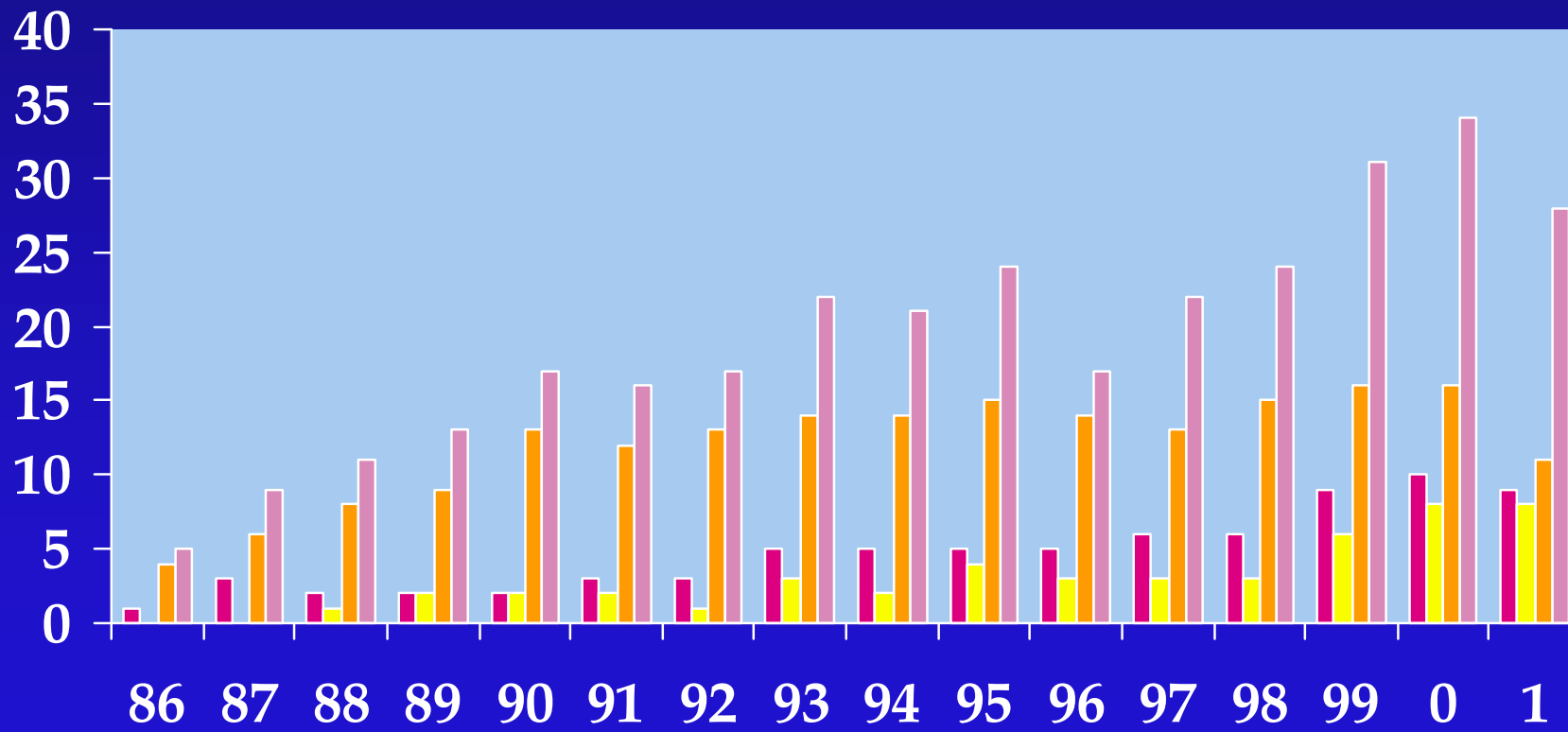
- Design and analysis of LANs (and issues pertaining to them).
- Design of ATM switch fabrics.
- Network security.
- Optical Computing.
- Design and Implementation of Distributed Processing Systems
- Design, Modeling, Implementation and Testing of Digital Systems
- Design of Websites using current web-technologies
- Shared Memory Multiprocessor System Design and Parallel Algorithms for Application in the Area of Robotics
- Design of Various Tools/Techniques for Design Automation of VLSI Systems
- etc

# Community Services

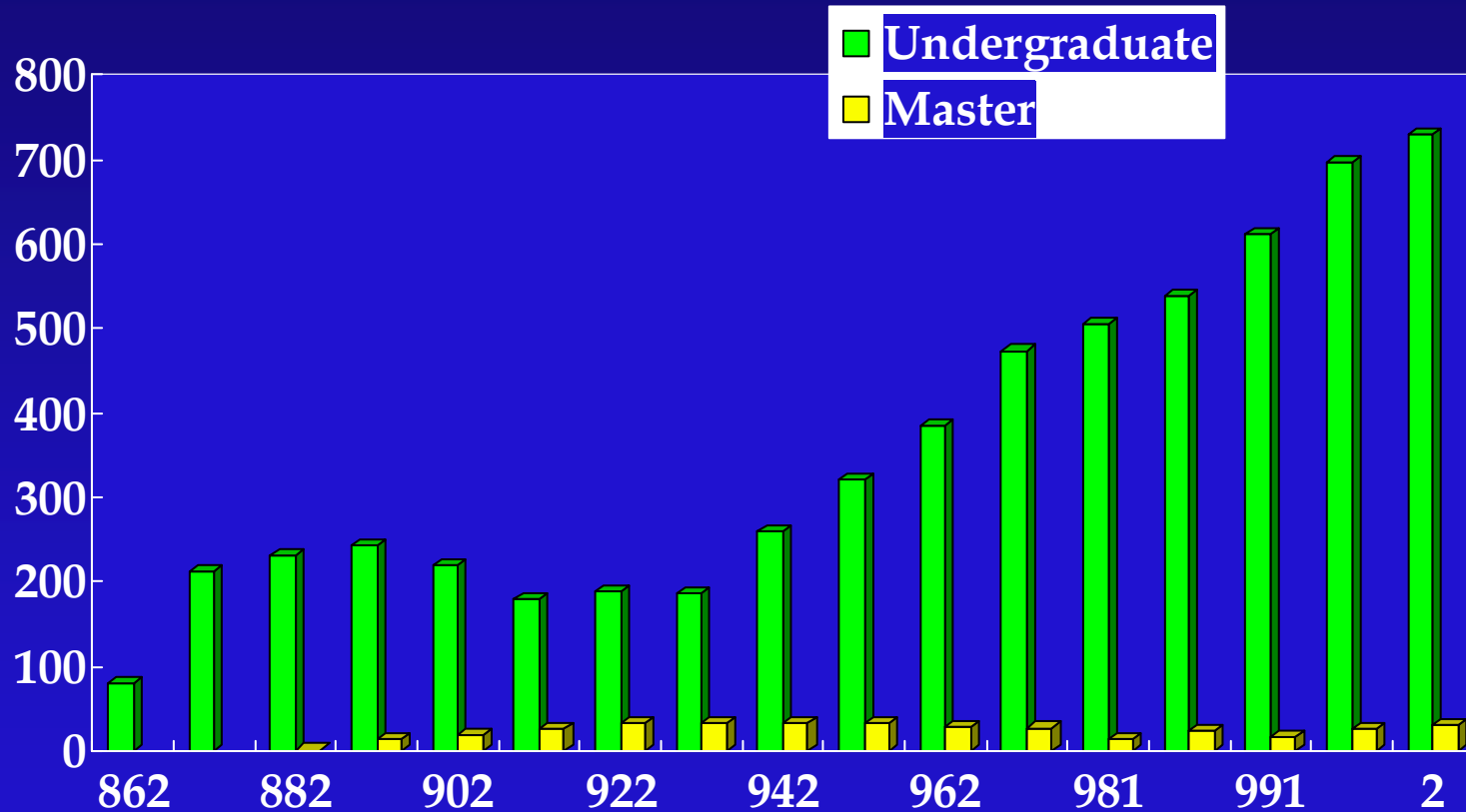
- ☞ Seminars
- ☞ Computer Exhibition
- ☞ Short Courses
  - » Local Area networks
  - » Data Communications and Computer Networks
  - » Internet services and applications
  - » Mobile Networks
  - » Personal Computers

# Faculty

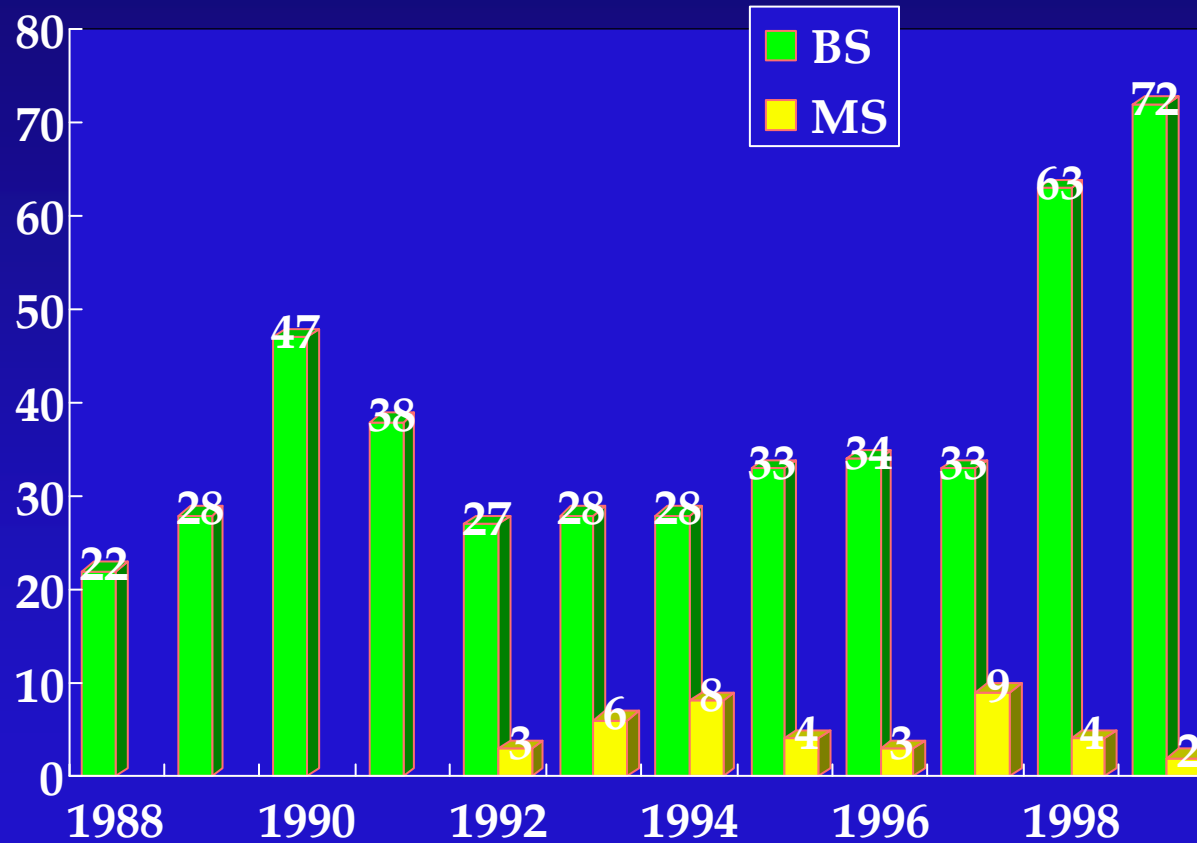
■ Lecturer ■ Grad. Assist. ■ Ph. D. ■ Total



# Number of Students



# BS & MS Graduates



# Teaching Laboratories

- Computer Networking and Data Communications Laboratory
- Digital System Design Laboratory
- Microprocessors Laboratory
- Robotics Laboratory
- Printed Circuit Boards Manufacturing Center
- Logic Design Laboratory
- General purpose PC Laboratory

# Job Opportunities

- The demand for computer engineers is continuously increasing in various domains such as: data communication and computer networks, computer and microcomputer engineering, data processing centers, Internet companies, etc.
- Today, job opportunities are excellent for COE graduates, and it is the department of choice for most students joining our university.

# Major Employers of COE Students

- ☞ Saudi Aramco
- ☞ Royal Commission for Jubail & Yanbu
- ☞ National Information Center
- ☞ Ministry of Defense & Ministry of Interior
- ☞ Petrochemical companies
- ☞ Financial Institutions
- ☞ SABIC
- ☞ Advanced Electronics
- ☞ Universities
- ☞ Computer systems and networks companies
- ☞ Internet services and applications companies



# Quotes from Visitors

The undergraduate and graduate programs in Computer Engineering at King Fahd University of Petroleum and Minerals **is by all measures substantially equivalent to ABET accredited programs in Computer Engineering at better U.S. institution.**

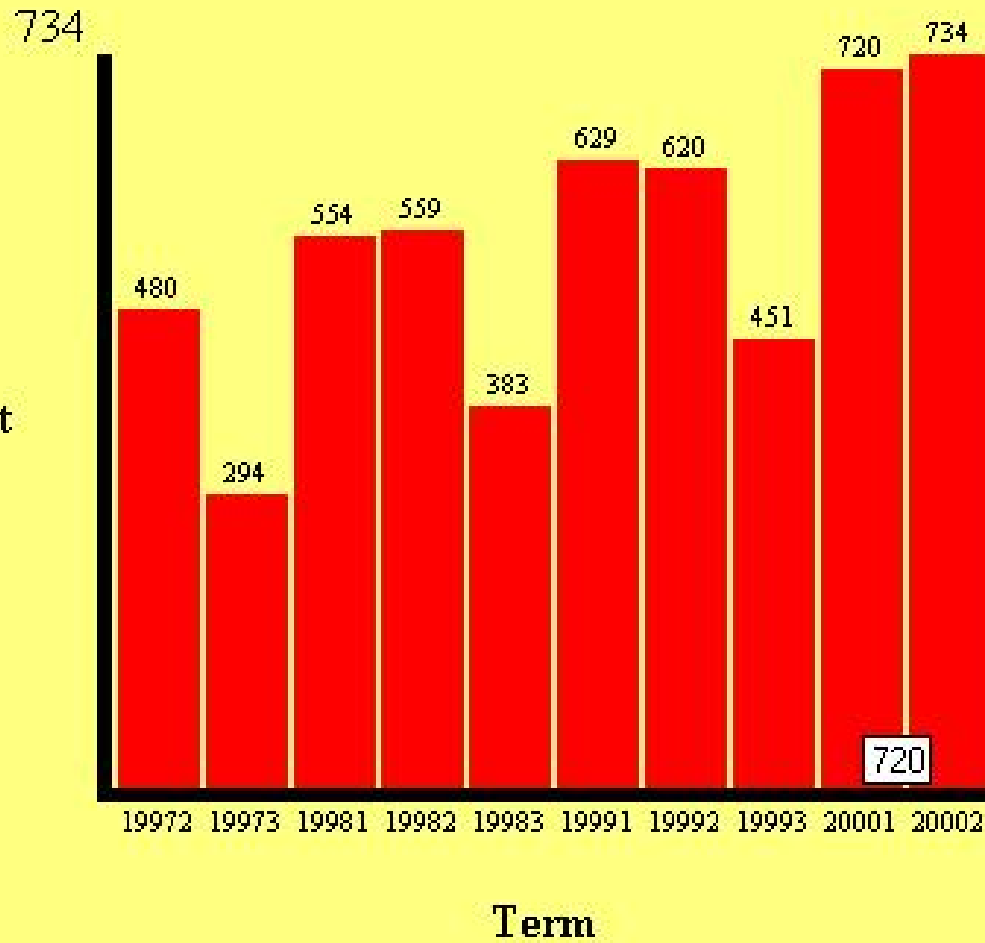
The Computer Engineering Students **appear to be the best in the university with good English skills and solid dedication to their studies.**

# The Department Today

- In terms of number of students we have grown from 354 in 1995 to 734 this term.
- The number of support staff has also grown.
- The number of professorial rank faculty has not grown at the same rate, but now we have a good number of lecturers to support lower level courses and laboratories, and are expecting 6 professorial rank faculty to join this term.
- Teaching space for laboratories has also increased, and we have plans to double that in the next two years.

# The Department Growth (students)

Enrollment



# Curriculum Evolution

- Since last ABET visit,
  - » Operating Systems course was introduced (4 credits, has a lab component, Java is used a programming language).
  - » Computer Networks course was extensively modified and laboratory introduced.
  - » Descriptions of several courses were revised such as Assembly Language, Organization, Architecture, etc.
  - » New tools, technologies, and trends were incorporated.
  - » VHDL, VLSI, Advanced Computer Networking (high-speed and wireless networks), Mobile computing, Java Programming, Design using FPGAs/PLDs, etc., are all part of the new electives.

# Curriculum Upgrades

- Frequency
- Recent modification
  - » Software component strengthened (Java)
  - » Co-op option introduced
  - » Flexibility enhanced (by increasing the number of both COE and Free Electives)
  - » Number of credits modified.

# Higher Education Opportunities

Universities where our undergraduate students are currently pursuing graduate studies (M.Sc/PhD) are:

- » Stanford University
- » University of California (San Diego/Santa Barbara)
- » University of Maryland (College Park)
- » Oregon State University
- » Texas A&M
- » Etc.,



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