

12.02 Capacity Analysis Project

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The rising STAR of Texas

Problem Statement

The focus behind this initiative is to determine the optimal number of engineering students with an average 10% increase in population that Texas State University can accommodate. This model will serve as a base and remain relatively generic with the idea of adding more majors into the model in the future.

Purpose

The aim of the project is to simulate the allocation of limited resources to the current population of student with a 10% growth rate forecast projection each year. To determine the number of faculty, course sections and classroom that will be needed when the population of student increase by 10% over the years, while optimizing the student and faculty ratio.

Objectives

- A Develop simulation model
- B Determine optimal number of sections, instructors, rooms, and students per term
- C Determine when capacity limit will be met with existing resources

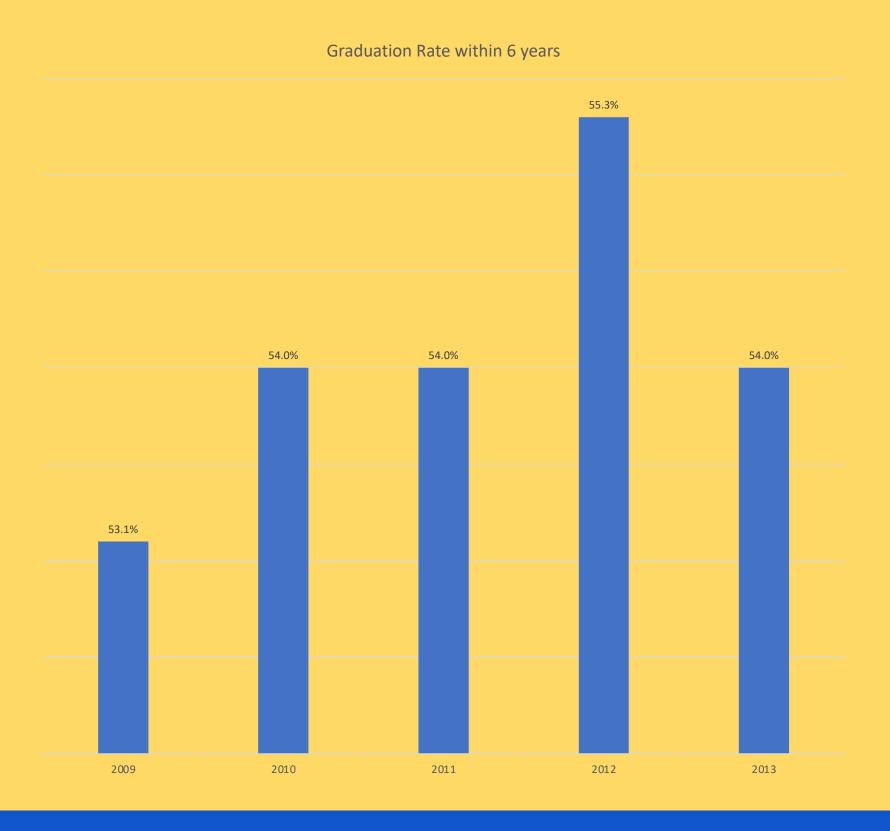
Information

Constraints include: Classrooms: the number of classrooms is a constraint because of the limited number of physical classrooms that are available for instruction, Sections: the number of sections is dependent on how many students are enrolled per course and instructor availability Students per section, Instructors: this is a high constraint and extremely limited resource as there are not enough instructors currently

Methodology



Measure



Capacity Min Capacity

IE Courses

IE 3320

IE 3360

IE 3330

IE 4310

IE 4370

IE 3340

IE 4355

IE 4392

IE 4393

IE 4350

IE 4320

IE 4360

IE 4340

MFGE 2332

MFGE L01 M

ENGR 1313

ENGR 4390

D

DEFINE

Define the

problem

- Collect and analyze data including enrollment, graduation rate, transfer rate

Year	Transfer rate
2009	9%
2010	9%
2011	8.9%
2012	8.7%
2013	8.7%

Analyze Phase

BS – Industrial Engineering with Applied Math minor (SC-BS/IE/APMA) 2019 Catalo						g year: College of Scien	ce and Engineerin
Freshman Fall semester	Freshman Spring semester	Sophomore Fall semester	Sophomore Spring semester	Junior Fall semester	Junior Spring semester	Senior Fall semester	Senior Spring semester
MATH 2471 (F,S,Su) Calculus I ENGR 1313 (F,S,Su) Engineering Design Graphics CHEM 1335 (F,S) Engineering Chamin by CHEM 1141 (F,S,Su) General Chaminary I lab	ENGR 2300	MATH 3377 (F,S,Su) Linear Algebra PHYS 2425 (F,S) Electricity & Magnetism MFGE 2332 (F,S) Mater int Selection	MATH 3323 (F,S,Su) Differential Equations ENGR 3375 (F,S,Su) Engineering Mechanics CS 1342 Programming for Scientists & Engineers First offered SP 2020	ENGR 3373 (F,S) Engineering Statistics ENGR 3311 (F,S) Mechanics of Materials ENGR 3315 (F,S) Engineering Economic Analysis	IE 3340 (F,S) Quality Engineering One from: MATH 2358 MATH 3330 PHYS 2435 PHYS 3315 Replaced E 4380	MATH 3373 (F,S,Su) Calcular III IE 4310 (F,S) Statistical Davign of Experiments IE 4370 (F,S) Probabilistic Operations Research Corequire 2 from: III.4310 (F), III.4355 (F,S), and III.4355 (F,S) Facilities Planning Also requires MFGE 2332 Choose 9 h IE 43 IE 434 IE 434 IE 436 IE 439 MFGE 43 ENGR ENGR	330 40 (F) 50 (F) 9A – F 1367 (S) 392 (F,S) 13190 14390

Future Plans

- -Java Script Coding
- Stack Overflow
- Statistical Questions
- Curate statistical questions prior to developing model

Evaluation Criteria

Objective	Weight
Develop simulation model	.50
Determine optimal number of sections	.30
Determine when capacity limit will be met with existing resources	.20

Team Members



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