Ranking King Saud University Computer Science Curriculum

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Contents

1 Introduction

King Saud University's computer science curriculum has many pros and cons, in this document we outline a criteria for judging courses and ranking the curriculum based on experts' opinions.

2 Assumptions

We make a number of assumptions regarding the evaluation of courses, these guide the evaluation process so they should be read carefully before moving on to results.

Assumptions

1. The course instructor's influence is minimized when ranking courses by imagining all courses being taught by a perfect instructor.
2. The ranking has been chosen by students mostly on their final semester, which would mean most of them have not studied the last semester and in turn we will not take its courses into consideration in this version.
3. The ranking has been chosen by students mostly belonging batch 439 and 438, different batches might rank courses differently as course content changes slowly.
4. Most electives are not taken into consideration, but a small number of popular electives will be considered.

3 Criteria

Courses are judged based on five criteria chosen by the most elite members of 439.

Criteria

1. **Applications**: This refers to real-world applications of the knowledge gained by studying the course.

2. **Relevance**: This refers to the new-ness of the knowledge taught compared to the current (as of this document's date) state of the art.

3. **Insight**: This refers to the quality of the knowledge gained with respect to understanding the world and expanding one's horizons.

4. **Understanding**: This refers to the proportion of the course's understanding portions over the memorization portions.

5. **Ease**: This refers to how easy the course was.

4 Method

4.1 Data

The data is collected and sorted using *Google Forms* in which each reviewer identifies their university batch and sex as well as rate an optional number of courses, i.e. the reviewer can review zero courses, or all courses if they wish. Each reviewer can optionally also provide extra notes alongside any course.

The number of courses ended up being 42, where we include the core plan as well as popular electives. After filtering courses with too few reviews we end up with a number of reviewers totalled 16 where the minimum number of reviews of any course is 2 and the maximum is 14, the distribution of counts is skewed to the right where the 50th percentile is 11 and the 75th is 13. After collecting the data we end up with (Courses, Criteria) X reviewer matrix.

4.2 Score calculation

Due to the low sample size on reviews of some courses we treat the problem as a *Bayesian estimation* problem. In our implementation we possess an idea of the original values we're predicting what we call the *prior*, which in this case will be the arithmetic mean of a criterion on some category[1], then we

[1]Categories are divided in this way: Humanities, Mathematics, Chemistry, Islamics, Physics, Computer science

update our beliefs given new evidence (reviews) by taking a weighted average of the criterion and the prior.

$$(r_1 * w_1 + .. + r_n * w_n + c_{mean} * w_c)/(\Sigma_{i=1}^{n} w_i + w_c)$$

We experimented with the weight of the category mean $c_{m_{ean}}$ and arrived at a weight half as weighty as the weight of the reviews.

After collecting and processing the data we will rank courses using a weighted mean of criteria, we will use three different weights.

Weighing technique

1. **General**: This weighing takes everything into account fairly, equivalent to a traditional mean.

   $$Applications + Relevance + Insight + Understanding + Ease$$

2. **Real-world**: This score mainly focuses on real world utility.

   $$Applications*1.5 + Relevance + Insight*0 + Understanding*0.2 + Ease*0.5$$

3. **Academic**: This score only focuses on the academic aspect of courses.

   $$Applications*0 + Relevance*0 + Insight*1.5 + Understanding*1.5 + Ease*0$$

5 Results

	Real-world score	Academic score	General score	categories
ENGLISH100	0.977969	0.587055	0.749899	Humanities
ARB100	0.644273	0.561107	0.559423	Humanities
MATH101	0.899391	0.883593	0.772007	Mathematics
CHEM101	0.520728	0.438133	0.445344	Chemistry
STAT101	0.927789	0.804526	0.756429	Mathematics
TECH101	0.765262	0.545605	0.626730	Humanities
ENTREPRENEUR101	0.601895	0.521720	0.530546	Humanities
FAJAB101	0.600165	0.538924	0.546742	Humanities
NAHAJ101	0.638404	0.661528	0.594242	Humanities
ENGLISH110	0.918583	0.582118	0.713858	Humanities
SALAM107	0.754027	0.638643	0.659744	Islamics
PHYS104	0.624921	0.534890	0.519392	Physics
MATH106	0.794863	0.735696	0.674323	Mathematics
CSC111	0.984843	0.934987	0.849246	Computer science
MATH151	0.954951	0.868024	0.817721	Mathematics
SALAM108	0.634832	0.415596	0.526326	Islamics
CSC113	0.840633	0.775292	0.730219	Computer science
CSC220	0.862635	0.832111	0.739635	Computer science
MATH244	0.831908	0.716022	0.674008	Mathematics
CSC212	0.943643	1.000000	0.839300	Computer science
CSC215	0.801212	0.781024	0.676474	Computer science
MATH281	0.848302	0.846393	0.748259	Mathematics
CSC304	0.676360	0.582436	0.612944	Computer science
CSC380	0.795881	0.727745	0.676944	Computer science
CSC227	0.740514	0.637227	0.619513	Computer science
CSC311	0.993665	0.991418	0.866180	Computer science
CSC339	0.671742	0.846109	0.679513	Computer science
CSC343	0.659292	0.501000	0.529513	Computer science
CSC361	0.801822	0.819164	0.703416	Computer science
CSC329	0.971137	0.964173	0.849513	Computer science
CSC340	0.609492	0.737127	0.586180	Computer science
CSC453	0.658107	0.646309	0.582847	Computer science
CSC496	0.898492	0.796582	0.736309	Computer science
PHYS103	0.611916	0.635857	0.542905	Physics
CSC443	0.683071	0.549409	0.578540	Computer science
CSC462	1.000000	0.922291	0.843796	Computer science
CSC489	0.792190	0.732545	0.691387	Computer science

5.1 Visuals

We include the most important visualizations done. Which are the general scores ranking and the weighted scores ranking. More visualization and a live demo with interact-able graphs can be found here.

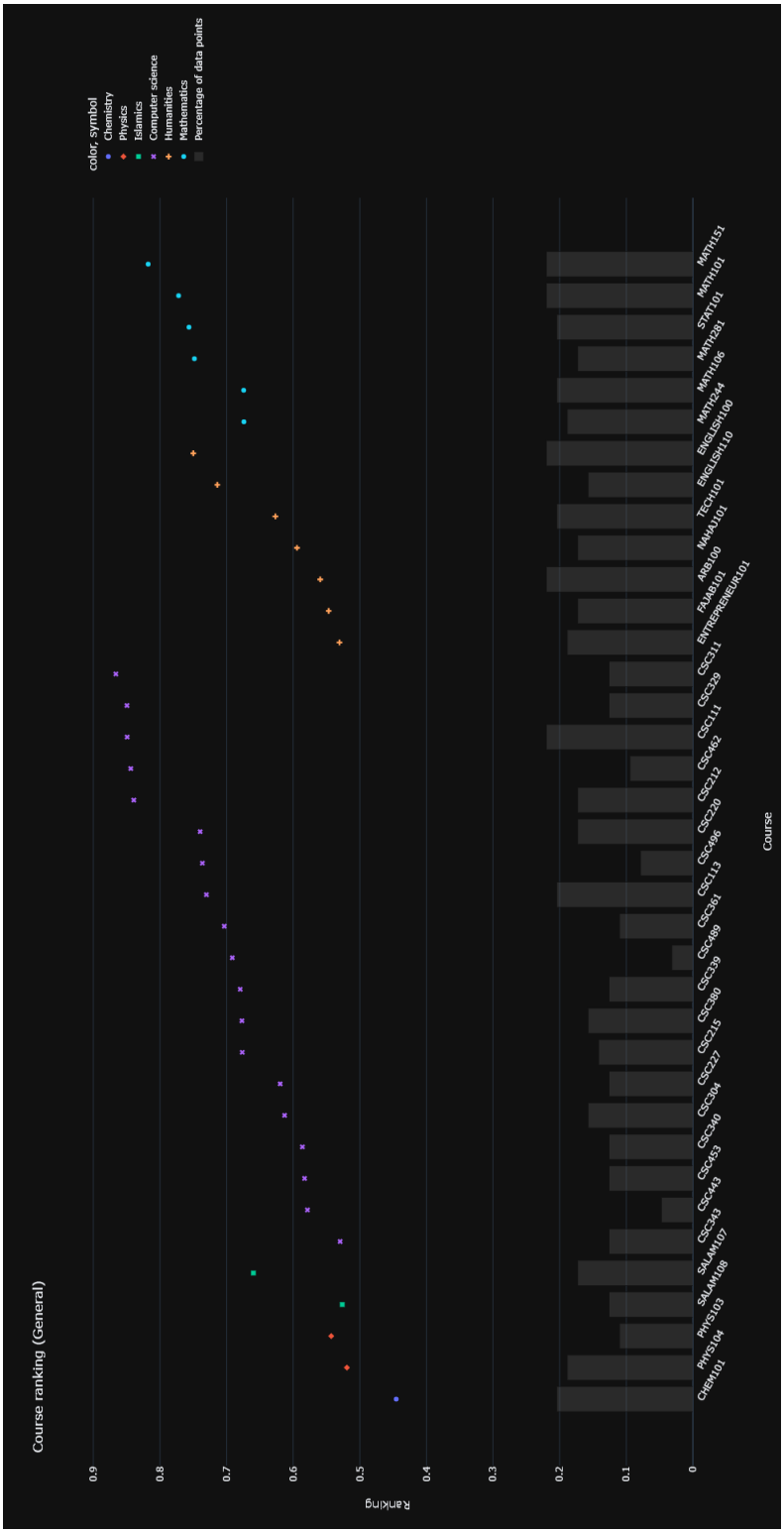

Figure 1: Scores based on general ranking

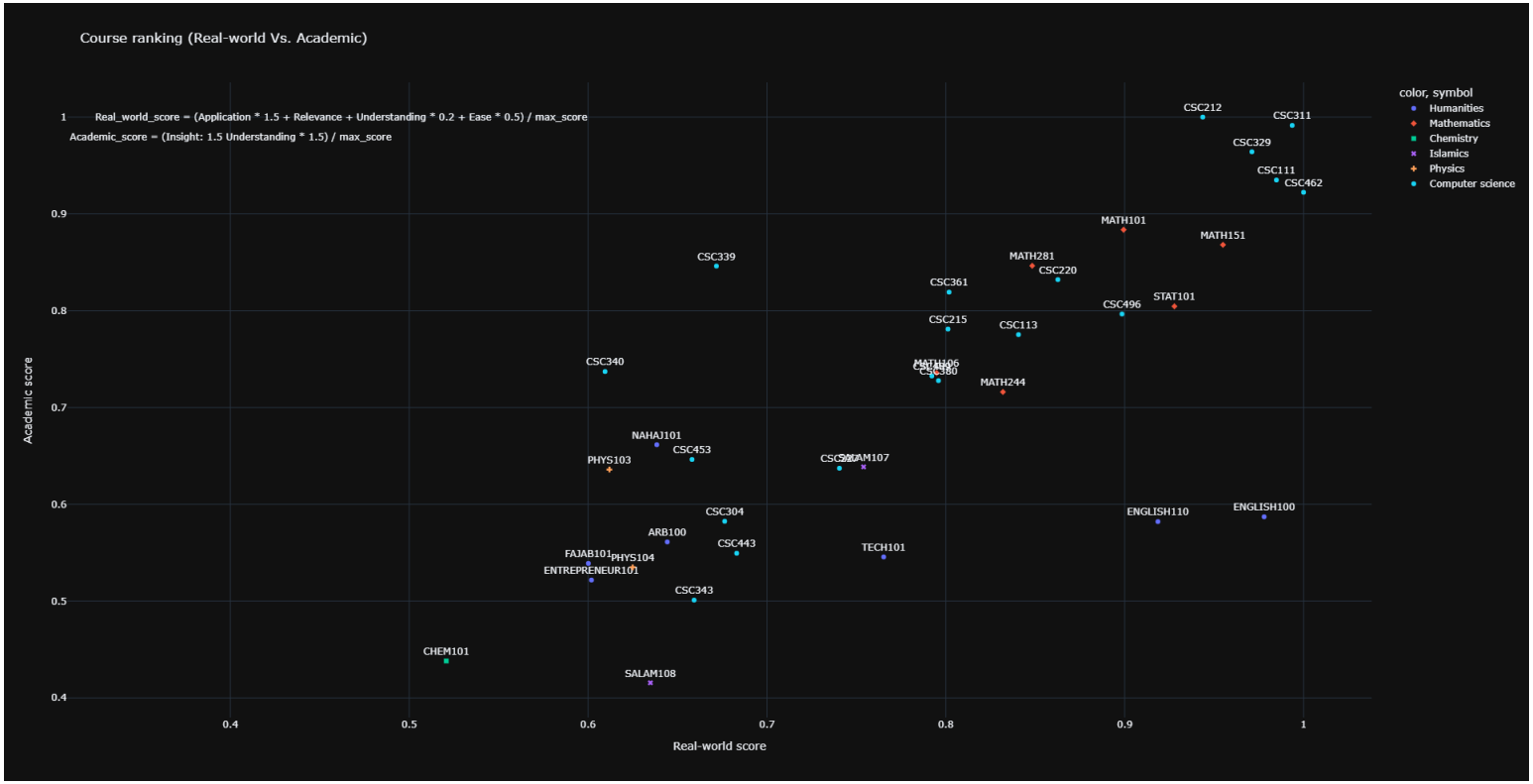

Figure 2: Scores based on Real-world Vs. Academic ranking

5.2 Observations

Yada yada

6 Conclusion

Yada yada

6.1 Code

The code can be found at `https://github.com/Hawzen/Course-Ranking`