

SDSC6027: TOPICS OF AI FOR COMPUTATIONAL SOCIAL SCIENCES

New Syllabus Proposal

Effective Term

Semester A 2026/27

Part I Course Overview

Course Title

Topics of AI for Computational Social Sciences

Subject Code

SDSC - Data Science

Course Number

6027

Academic Unit

Data Science (DS)

College/School

College of Computing (CC)

Course Duration

One Semester

Credit Units

3

Level

P5, P6 - Postgraduate Degree

Medium of Instruction

English

Medium of Assessment

English

Prerequisites

Nil

Precursors

Nil

Equivalent Courses

Nil

Exclusive Courses

Nil

Part II Course Details

Abstract

This course provides students with an extensive exposure to causal inference, causal machine learning, and selected topics in natural language processing and reinforcement learning, with a heavy emphasis on practical applications. Topics include potential outcome, matching, regression discontinuity, instrumental variables, difference-in-differences, synthetic control, topic modeling, multi-armed bandit.

Course Intended Learning Outcomes (CILOs)

CILOs		Weighting (if app.)	DEC-A1	DEC-A2	DEC-A3
1	Explain clearly fundamental frameworks and methods in causal inference	20	x		
2	Comprehend conceptually and in technical specifics various causal inference methods	20	x	x	
3	Evaluate existing practices in causal modelling of social data and seek ways to improve the existing practices	30	x	x	x
4	Apply appropriate identification and estimation methods to solve given practical causal modeling problems	30	x	x	x

A1: Attitude

Develop an attitude of discovery/innovation/creativity, as demonstrated by students possessing a strong sense of curiosity, asking questions actively, challenging assumptions or engaging in inquiry together with teachers.

A2: Ability

Develop the ability/skill needed to discover/innovate/create, as demonstrated by students possessing critical thinking skills to assess ideas, acquiring research skills, synthesizing knowledge across disciplines or applying academic knowledge to real-life problems.

A3: Accomplishments

Demonstrate accomplishment of discovery/innovation/creativity through producing /constructing creative works/new artefacts, effective solutions to real-life problems or new processes.

Learning and Teaching Activities (LTAs)

LTAs		Brief Description	CILO No.	Hours/week (if applicable)
1	Lecture	Students will engage in formal lectures to gain knowledge about various computational methods for causal inference.	1, 2, 3, 4	3
2	Project	Students will form teams to work on a project involving computational analysis of social data.	2, 3, 4	in or after classes

Assessment Tasks / Activities (ATs)

ATs	CILO No.	Weighting (%)	Remarks ("-" for nil entry)	Allow Use of GenAI?	
1	Hands-in assignments	2, 3, 4	15	These are skills-based assessment to enable students to demonstrate the basic concepts and methods in causal inference, and applications of the methods in some applications.	Yes
2	Test	1, 2, 3, 4	15	Questions are designed for basic techniques of causal inference to see how well the students have learned fundamental concepts and methods, and applications of causal modeling	No
3	Project	1, 2, 3, 4	35	-	Yes

Continuous Assessment (%)

65

Examination (%)

35

Examination Duration (Hours)

2

Minimum Examination Passing Requirement (%)

30

Assessment Rubrics (AR)**Assessment Task**

Hands-in assignments (for students admitted in Semester A 2026/27 & thereafter)

Criterion

Ability to learn the basic concepts, apply methods and algorithms for causal modelling.

Excellent

(A+, A, A-) High

Good

(B+, B, B-) Significant

Fair

(C+, C, C-) Moderate

Marginal

(D) Basic

Failure

(F) Not even reaching marginal levels

Assessment Task

Test (for students admitted in Semester A 2026/27 & thereafter)

Criterion

Ability to understand and apply fundamental concepts and technical specifics of causal inference.

Excellent

(A+, A, A-) High

Good

(B+, B, B-) Significant

Fair

(C+, C, C-) Moderate

Marginal

(D) Basic

Failure

(F) Not even reaching marginal levels

Assessment Task

Project (for students admitted in Semester A 2026/27 & thereafter)

Criterion

Ability to apply appropriate causal inference methods in practical applications.

Excellent

(A+, A, A-) High

Good

(B+, B, B-) Significant

Fair

(C+, C, C-) Moderate

Marginal

(D) Basic

Failure

(F) Not even reaching marginal levels

Assessment Task

Examination (for students admitted in Semester A 2026/27 & thereafter)

Criterion

Ability to solve learning tasks using causal inference methods.

Excellent

(A+, A, A-) High

Good

(B+, B, B-) Significant

Fair

(C+, C, C-) Moderate

Marginal

(D) Basic

Failure

(F) Not even reaching marginal levels

Part III Other Information

Keyword Syllabus

Potential outcome, Matching, Regression Discontinuity, Instrumental Variables, difference-in-differences, synthetic control, Double Machine Learning, Dynamic Double Machine Learning, Causal Forests, Deep Instrumental Variables, Topic Modeling, Multi-armed Bandit

Reading List**Compulsory Readings**

Title	
1	Guido W. Imbens & Donald B. Rubin (2015). Causal Inference for Statistics, Social, and Biomedical Sciences. Cambridge University Press.