Indian Institute of Technology, Kanpur
Proposal for the new course

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1. Course No: ECO 5XX:
2. Course Title: Applied Computable General Equilibrium (CGE) Modelling with GTAP and Policy Applications
3. Per week Lecture: 3(L)+0(T)+0(P)+0A:9
4. Duration: One Semester (40 Lectures)
5. Instructor: Prof. Somesh Kumar Mathur
   Any faculty who gets interested in teaching of this course
   This course provides rigorous training in Computable General Equilibrium (CGE) modelling with a strong emphasis on the theoretical modelling/ GTAP framework and economy-wide policy analysis.
6. Credits: 3-0-0-9
7. Level: Advanced Undergraduate / Masters
8. Proposing Department: Department of Economic sciences

Rationale and Need for the Course

Policy impact on growth and welfare goes beyond the understanding of the partial equilibrium models (A partial equilibrium model determines the equilibrium price and quantity in a single market by considering only the demand and supply conditions of that market, without accounting for interactions with the rest of the economy). The economic channels through which policies impact growth and welfare are allocative and technical efficiency, terms of trade, investment savings balance, endowment effects, preference shifting impacts among others. Governments, international organizations and researchers increasingly rely on computable general equilibrium models to evaluate trade agreements, climate policies, carbon taxation, technological progress, energy transitions and regional development strategies. The course equips students with theoretical and practical skills required for policy-oriented research. A general equilibrium model is a framework in which equilibrium is determined simultaneously across all goods, factor, and institutional markets, taking into account the interdependence among economic agents and sectors.

Course Objectives

- Understand the theoretical foundations of both partial and general equilibrium modelling.

- Learn construction and interpretation of Social Accounting Matrices (SAM).
- Understand GTAP database architecture and model structure.
- Conduct trade, environmental and tax policy simulations.
- Interpret welfare, GDP, output and emissions outcomes.
- Develop independent CGE research projects.

Learning Outcomes

Upon completion students will be able to:

1. Explain the logic of economy-wide modelling.
2. Build and interpret SAM-based frameworks.
3. Use GTAPAgg and RunGTAP software.
4. Design policy simulations.
5. Evaluate welfare, trade and environmental impacts.
6. Prepare publishable CGE research studies.

Detailed Course Outline

S.No	Broad Title	Topics	No. of Lectures
1	Introduction to CGE Modelling	Nature and evolution of CGE models; Input-Output and Social Accounting Matrix (SAM); Partial vs General Equilibrium; Applications in trade, environment and development	4
2	Economic Foundations of CGE Models	Consumer behaviour; Producer behaviour; Market clearing; Armington assumption; Trade and factor mobility	4
3	Social Accounting Matrix and Data Preparation	Structure of SAM; Circular flow of income; Calibration concepts; Building and interpreting SAMs	4
4	GTAP Database and Global Trade Structure	GTAP database architecture; Regions, sectors and factors; Trade protection data; Energy and emissions accounts	4
5	GTAP Model Structure	Production nests; Household demand; Government sector; Investment-savings equilibrium; Model equations	4

S.No	Broad Title	Topics	No. of Lectures
6	Model Closure and Calibration	Closure rules; Endogenous and exogenous variables; Short-run and long-run closures; Calibration techniques	4
7	GTAPAgg and RunGTAP Applications	Database aggregation; Model setup; Swap statements; Running simulations; Interpreting outputs	4
8	Trade Policy Simulations	Tariff liberalisation; Free Trade Agreements (FTAs); Regional integration; Trade creation and trade diversion analysis	4
9	Environmental and Energy Applications	Carbon taxation; Emissions accounting; Technological progress; GTAP-E framework; Climate policy evaluation	4
10	Advanced Applications and Research Projects	Dynamic CGE models; Multi-regional CGE; Welfare decomposition; Sensitivity analysis; Research paper development and presentation	4

Laboratory and Software Component

Students will receive practical training in GTAPAgg, RunGTAP, GEMPACK and GTAP Data Base. Laboratory sessions will include aggregation exercises, tariff simulations, carbon tax scenarios, technological progress shocks and welfare decomposition.

Pedagogy

The course combines lectures, software demonstrations, guided laboratory exercises, policy case studies, journal article discussions and project-based learning.

Assessment Scheme

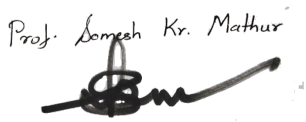
Quiz I – 10%
Quiz II – 10%
Assignments/Lab Exercises – 20%
Mid Semester Examination – 20%
Research Project and Presentation – 15%
End Semester Examination – 25%

Suggested Research Applications

India-GCC FTA, India-EU FTA, RCEP, CPTPP, carbon taxation, energy transition, climate policy, productivity shocks, trade diversion, welfare decomposition and regional development.

Reading List

- Hertel, T. W. (1997). Global trade analysis: modeling and applications. Cambridge university press.
- Dixon, P. B., & Jorgenson, D. (Eds.). (2013). *Handbook of computable general equilibrium modeling*. Newnes.
- Burfisher, M. E. (2021). Introduction to computable general equilibrium models. Cambridge University Press.
- Huff, K., & Hertel, T. (2000). Decomposing welfare changes in the GTAP model.
- GTAP Documentation Series.
- Selected GTAP Journal Articles.(Journal of Economic Analysis)



Dated: Proposer Name: Prof. SK Mathur

Date:_____DUGC/DPGC convenor

The course is approved/ not approved

Chairman SPGC

Date: