I. Rationale:
The quality of policy and planning can be improved when relevant economic methods of analysis are used in combination with other non-economic considerations. This course provides some of the relevant economic methods.

II. Course Aims and Objectives
The course is designed to enable students to comprehend and use (1) Computable General Equilibrium (CGE); and (2) Analytic Hierarchy Process (AHP) as a special form of Analytic Network Process (ANP). These two are useful analytical tools for practical quantitative policy and planning analysis. A great deal of discussions will be placed on the rationale and operations of the models, before focusing on policy-oriented analysis using such models. CGE is an economy-wide technique where prices and policy variables are endogenous, a critical feature often absent in other economy-wide models. In contrast to partial equilibrium, CGE is capable to capture the direct and indirect interactions among all components, e.g., production, income distribution poverty, pollution, migration, etc., and its specification is based on established economic theories. AHP and ANP, on the other hand, is a non-Bayesian decision-making approach with more flexible specifications and relatively free of assumptions. It is extremely useful and highly practical for decision making and policy evaluation especially when data/information are limited.

III. Format and Procedures:
The course is in lecture format. There is no final exam. Students are expected to be active in class discussions and to complete a set of
assignments. Group learning is encouraged. A final project is to be submitted during the exam period.

**IV. Course Requirements**

To understand fully the course contents, knowledge in macro and microeconomics, basic quantitative models, and optimization is required. Familiarity with calculus and matrix operations is also helpful.

1. **Class attendance and participation policy:** Since the methods to be discussed are cumulative and sequential in nature, i.e., each topic is related to or built upon other topics discussed before, students are expected to attend all class meetings.

2. **Course readings:** There is no required reading. The class meetings should be sufficient for students to understand about the discussed analytical tools. The following list, classified into main and background readings, is provided only in case students need further classifications and more examples.

**Main readings:**


**Background readings (some of them are downloadable)**

- **For CGE modelling:**
  5. *Cameroon General Equilibrium Model Using NLP*. This model is a blueprint of a basic CGE model that follows closely the CGE model of Dervis, De Melo and Robinson in the late 1970s.
7. Simulating Economy-wide Models to Capture the Transition from Financial Crisis to Social Crisis, by Iwan Azis, in “The Annals of Regional Science,” Vol. 34, Issue 2, 2000. This article demonstrates the use of SPA and CGE models to measure the impact of a financial shock on income distribution.

8. Linking Pollution and Macroeconomic Variables, by Iwan Azis, in M. Chatterji & Yang Kaizhong (eds) “Regional Science in Developing Countries: Perspectives for the Future,” Macmillan and St Martin’s Press, 1997. This is an example of the use of a CGE model using IO table to analyze the tradeoffs between growth/efficiency and pollution/environment.

9. Mitigating Climate Change, by Iwan Azis, in “Crisis, Complexity and Conflict,” by Iwan Azis, Emerald 2009. This shows the application of CGE model for dynamic analysis.

10. A Drastic Reduction of Fuel Subsidies Confuses Ends and Means, by Iwan Azis, in “ASEAN Economic Bulletin,” April, 2006. This demonstrates the planning and policy analysis of fuel subsidy and domestic debt based on FCGE.


12. The Relevance of Price Endogenous Models, by Iwan Azis, in “Regional Science Review,” Vol 17, 1998, p.1-20. This shows how a CGE model can be used to analyze economic reform, and it also shows the difference between SAM multiplier and CGE multiplier.


15. Managing Elevated Risk, by Iwan Azis & Hyun Song Shin, Springer, 2015. Chapter 5 of the book contains results of FCGE analysis on the impact of capital flows on macroeconomy and income distribution and poverty. It also shows the application of perception-based study (like in AHP) for a similar analysis.

For AHP

2. Decision Making in Economics Political, Social and Technological Environments with the Analytic Hierarchy Process, by Thomas L. Saaty (1994). vol VII, RWS Publications. This is a basic source for understanding AHP.


9. Predicting a Recovery Date from the Economic Crisis of 2008, by Iwan Azis in “Socio-Economic Planning Sciences” 44, p 122-129 (2010). This is another example showing how ANP is used to make prediction.


3. This is a 3-credit course

V. Grading Procedures: Grades will be based on a set of assignments and one final project. Evaluation will be based on assignments and students’ participation in class discussions (50%), and a final project (50%).

VI. Academic Integrity
Each student in this course is expected to abide by the Cornell University Code of Academic Integrity.
http://cuinfo.cornell.edu/Academic/AIC.html
Any work submitted by a student in this course for academic credit will be the student's own work, except in the cases of projects that are specifically structured as group endeavors. [Optional: For this course, collaboration is allowed in the following instances: list instances.] You are encouraged to study together and to discuss information and concepts covered in lecture and the sections with other students. You can give "consulting" help to or receive "consulting" help from such students. However, this permissible cooperation should never involve one student having possession of a copy of all or part of work done by someone else, in the form of an email, an email attachment file, a diskette, or a hard copy. Should copying occur, both the student who copied work from another student and the student who gave material to be copied will both automatically receive a zero for the assignment. Penalty for violation of this Code can also be extended to include failure of the course and University disciplinary action. During examinations, you must do your own work. Talking or discussion is not permitted during the examinations, nor may you compare papers, copy from others, or collaborate in any way. Any collaborative behavior during the examinations will result in failure of the exam, and may lead to failure of the course and University disciplinary action.

VII. Accommodations for students with disabilities
In compliance with the Cornell University policy and equal access laws, I am available to discuss appropriate academic accommodations that may be required for students with disabilities. Requests for academic accommodations are to be made during the first three weeks of the semester, except for unusual circumstances, so arrangements can be made. Students are encouraged to register with Student Disability Services to verify their eligibility for appropriate accommodations.
VIII. Tentative Course Schedule:

A. Introduction (week 1)
   - Why the use of economy-wide models
   - Extending IO and SAM
   - Alternative approach to decision making: subjective & objective evaluation

B. CGE modeling
   1. Elementary CGE (week 2)
      - Evolution
      - Two-sector closed economy model
      - Open economy model
      - A set of non-linear simultaneous equations
   2. Inter-industry or IO-based CGE (week 3 & 4)
      - Relative price & numeraire
      - Walras’ law
      - Elasticity of substitution
      - Calibration and estimation
      - Applications: pollution model & transport costs
   3. SAM-based CGE (week 5 & 6)
      - The framework
      - Nested production function: CES & CET
      - Macro closure
      - Model verification
      - Applications: policy evaluations and perturbations
   4. FSAM-based CGE: financial computable general equilibrium (FCGE) (week 7-9)
      - Linking financial assets & liabilities to real sector
      - Implications on household income and inequality (Piketty’s hypothesis)

C. Analytic Hierarchy Process (AHP)
   1. Why AHP (week 10)
      - Human perceptions as information
      - Hierarchical structure: criteria and alternatives
      - Clustering
   2. Specifications and measurements (week 10)
      - Relative ratio scale
      - Pairwise comparisons
      - Consistency and transitivity
      - Eigen value and eigen vector
   3. Applications (week 11-13)
      - Simple decision
      - Planning and forecasting
      - Conflict resolution
- Benefits-costs opportunity-risks (BOCR)
- Treating feedbacks and interactions

**D. Summary: limitations and possible extensions (week 14)**

**IX. Additional Resource Readings**
To be announced in class