MSc Science and Technology Policy and Management

proposal for a new programme Autumn semester 2007 onwards

Introduction

We propose a one year full-time (or part-time equivalent) vocationally orientated Masters programme in Science and Technology Policy and Management. The programme is aimed at practitioners and would-be practitioners in the growing domain dealing with strategic questions and future implications of science, technology and innovation – whether in organisations centrally concerned with policy and management issues in science and technology, such as science policy units in government, or in other areas where scientific and technological issues are central, such as medical, environment or development policy. Students will most likely come from or be intending to find work in public sector agencies, consultancies, professional and industry associations, trade unions and similar organisations. The programme will also suit scientific and technological staff in research- and high-technology-based enterprises who, as managers and entrepreneurs, want a broader understanding of the context and implications of their work and of the processes involved in innovation and the exploitation of science. While the programme is not intended primarily as a preparation for technology management positions in the narrow sense (see the comments on technology management courses below), there may be positions in other types of enterprise, particularly those dealing with technology strategy in large corporations, for which this programme will be useful.

Academic strategy

The programme will be based in the Research Centre for Social Sciences. RCSS is the main location in the University for research and teaching in technology studies and innovation policy, one of the internationally recognised research strengths of the School of Social and Political Studies. It will also draw however on expertise and offerings from other units and individuals in the University, particularly colleagues in the broader Institute for the Study of Science, Technology and Innovation (ISSTI), and from the Management School and Economics. The programme will allow staff to bring into postgraduate teaching much more of the theoretical development and case material from their research and policy work.

RCSS currently contributes much of the teaching to the MSc in Science and Technology Studies, coordinated from Science Studies. The proposed programme builds on the experience and content of that existing teaching, but extends it in a significant new direction. The MSc STS largely attracts students heading for an academic career, and contributes to the intake of doctoral students in the broad STS field supervised by various members of ISSTI. The enrolment in the MSc STS is consistent and valuable, but even with renewed publicity efforts a programme of this character is unlikely to grow much beyond the current 6 to 8 students per year. While there is some overlap in content, particularly in areas of theory common to both, the new programme aims at a quite different audience, one from which in the longer term there are more substantial and sustainable student numbers to be captured. We do not believe the new programme will attract students away from the MSc STS.

The programme will cover three areas:

• essential theoretical and thematic grounding from STS in sociological and economic treatments of science and technology;
• generic policy and management issues in science, technology and innovation and approaches to them;
• specialised material in a particular area of technology or a particular set of issues concerning science, technology and innovation.

There will be a strong emphasis on
• identifying, comparing and appropriately deploying the range of disciplinary approaches, and different currents of thought, concepts and techniques, pertinent to analysing science and technology policy and management issues and to devising interventions, from the social sciences and management literatures;
• interdisciplinary approaches, including those from STS – again in both analysis and practice; and
• sharing and reflecting on students’ experiences in practice, and dealing with issues relevant to the organisations and contexts they work in.

The dissertation parameters will the same as for a standard MSc: four months and 15000 words. The types of project permitted, however, will be wider than those envisaged in the MSc STS. Students will be encouraged to apply concepts and skills from the coursework to a current issue or problem, where possible in the area of their current or intended work, and possibly formulated in cooperation with their employing or sponsoring organisation or another outside body. Accordingly, they may be encouraged to undertake a limited amount of appropriate empirical work, and will need to formulate the project in consultation with their supervisor, and start preliminary work, well in advance of the dissertation period.

The programme will initially have two different specialisms:
• Life Sciences and Biotechnology
• Information and Communication Technologies.

The two routes through the programme share several core courses and options, but each have a number of specialist courses. We envisage being able to develop further specialist routes in future years, particularly, given the existing expertise and research interests across ISSTI, in the areas of
• energy and environment, and
• international technology transfer and development.

We have also started discussion with colleagues within SSPS and in other Schools (particularly Management and Engineering) about possible courses which for future years could be placed in this programme and elsewhere as it grows.

Delivery will be on campus, by lectures and seminars, and with individual supervision for the dissertation. We shall consider supplementing these methods with web material and other independent and flexible learning resources in future years.

After two years of successful operation, we would investigate inserting the programme into one or both of the current European cooperative ventures at Masters level:
• the PRIME Master level exchange programme, a scheme run as part of the PRIME Network of Excellence (set up under FP76 and to be extended under FP7, of which ISSTI is already a member) – this scheme allows students to study for a semester in
the programme at one of nine other partners, currently including Twente, Roskilde, Manchester, Maastricht and Linköping.

- the European Inter-University Association on Science, Technology and Society (ESST) Masters programme in *Society, Science and Technology in Europe*—partners in this scheme, including the Universities of Linköping, Lund, Oslo and Maastricht, provide a variety of specialisations.

**Programme aims and outcomes**

**Aims**

- to prepare students for positions in policy and management areas dealing with science, technology and innovation, or in other areas where scientific and technological issues are central, such as medical, environment or development policy—primarily in public sector agencies, consultancies, professional and industry associations, trade unions and similar organisations
- to provide to students from all academic backgrounds a solid grounding in the sociological, economic, political, cultural and other approaches to understanding science, technology, innovation and related issues, that have developed in science and technology studies, policy studies, and related social science areas
- to enable students to understand the role, operation and limitations of policy, strategy, foresight, regulation and other interventions in the development and application of science and technology
- to enable students to appreciate the character and importance of interdisciplinary approaches to understanding and resolving policy and management issues in science, technology and innovation
- to provide students with a substantive knowledge and understanding of a selection of significant current institutions, issues and debates in science and technology policy and management, the concepts and tools to analyse them, and an appreciation of their complexity
- to give students opportunities and experience
  - in formulating and analysing policy and management problems in science, technology, innovation and related issues
  - in developing and evaluating strategies and methods to tackle them
  - in using and evaluating appropriate techniques and procedures for policy-formulation, decision-making, assessment and implementation
  - in sharing, reflecting on, and relating the course material to, their own experiences as practitioners
- to develop appropriate research, analytical and communication skills, and associated practical competences—in particular, clear written and oral presentations supported with appropriate argument and evidence
- to increase students’ awareness of appropriate sources of information and arguments, and their capabilities in critically appraising and using material from them

**Learning outcomes**

On successful completion of the programme students will have demonstrated through written work, including a dissertation, oral presentations and other contributions in class, that they
• have a substantive knowledge and understanding of a selection of important policy and management issues in science, technology and innovation, and of the contending viewpoints and claims on these issues, across a range of different science and technology areas but particularly in their area of specialism

• can identify and characterise key theoretical approaches to understanding issues in science, technology and innovation, and to understanding and evaluating policy and management processes and interventions in those areas, and identify advantages, problems and implications of these approaches

• can critically evaluate contributions to the academic and public debates on these issues, and decisions on them

• can identify, deploy and evaluate a selection of techniques and procedures used in policy-formulation, decision-making, futures work, assessment and implementation

• can apply these understandings and skills, and deploy some of these approaches, concepts and techniques, in analysing a new problem in policy or management in science, technology and innovation, and in devising, evaluating and justifying options for intervention

Resource strategy

We propose a development strategy that initially creates only small additional teaching loads and minimises resource requirements and risk. It builds incrementally on existing offerings and staffing, and deploys new or revised courses in other programmes to spread development costs.

Thus only modest additional staffing requirements are generated: the new course development and the expanded role for RCSS that the programme entails form part of the justification (alongside existing teaching commitments and our contribution to the new MSc in Translational Medicine), for the three 20% teaching positions which are the subject of a separate submission to the School planning process for 2007.

We aim at an initial enrolment in the new MSc STPM programme of 3 domestic and 3 international students, rising to 6 of each in the second year as we implement a more concerted publicity strategy. These are modest and achievable targets which fit with the incremental development strategy, and are set lower than the sustained enrolments in the closest equivalent UK programmes (see below).

Two core courses common to both strands, Social and Economic Perspectives on Technology and Politics of Science and Technology, and one course particular to each strand, Social Shaping of Information and Communication Technology and Evolution and Dynamics of Biotechnology are already established and are shared with the MSc in Science and Technology Studies. The additional students in these courses from the new programme will represent an increase of about 50% in the first year, and can easily be accommodated in the existing class structures. The intake from the new programme will boost and smooth numbers in these shared courses, and help ensure their viability and effective teaching year to year.

There is one new core course common to the two strands, Policy and Management Issues in Science and Technology. It will be developed by current RCSS and Innogen staff and its time and costs will be absorbed without requiring dedicated resources. Some material from the course will also be deployed in the MSc in Translational Medicine, and will be suitable for future CPD initiatives.
It is clear that the distribution of topics among **SEPT**, **POST** and the new core **PMIST** course, are not ideal. We can negotiate some changes to the content of **SEPT** and **POST** for the first year of operation of the new programme, but we would need at a suitable opportunity later to rethink and rationalise the array of core offerings to suit their new dual role, and particularly for the **STPM** programme to provide a coherent core, to ensure comprehensive coverage, and to avoid excessive overlap.

One new core course, *Internet Society and Economy*, for the Information and Communication Technologies strand – also to be offered in the MSc in *Science and Technology Studies* – is being developed from material in an existing honours course and similarly entails limited effort by a current member of staff and no additional resource requirements.

The other new course included as an option, *Research Methods in STS: Data Collection*, is being developed as one of the School’s suite of research training courses.

Our approach to the development of the programme in subsequent years as enrolments and staff commitments allow, besides entailing some changes to the content of existing courses, will be to seek similar resource-sharing:

- considering and formulating new courses that can be made available in this programme – particularly to allow and in other postgraduate programmes in the University;
- considering and negotiating for inclusion new courses which other units offer;
- cooperating with other units in the development and joint teaching of new courses which can fit in this and other programmes.

As well as further specialisms, we can also consider adaptations to the programme content according to significant emerging student markets, for example by introducing more specific international focuses.

Again to minimise resource requirements, we propose that the new programme be administered for the first two years in conjunction with the existing MSc **STS** – sharing admissions, convenorship and examination procedures – with a view after that to transferring full responsibility to RCSS. While these initial arrangements make sense for internal purposes, however, it is essential that the programme have a separate and distinctive image in promotional materials and on especially on the University’s website. While we stress that the strong theoretical grounding in the programme draws much from STS, it is crucial that the programme is not seen externally as simply a variant on the existing STS offering. The programme will be publicised as an ISSTI initiative, thus associating it firmly with the broad and internationally recognised umbrella grouping.

We judge that the Library holdings in relevant areas are reasonable already and do not require a special initiative, but we shall be supplementing them with some recent material through the normal purchasing procedures.

Besides the learning resources available to students in the University and in the Graduate School, RCSS intends building a central collection of case study material on appropriate policy and management issues for use in class exercises and student assignments. ISSTI staff will be asked to provide and adapt material from their research work; documents, audio-visual materials and data sets will be obtained from other sources; and students will
be encouraged, whenever ethics and confidentiality conditions allow, to deposit material collected in the course of their assignments, class exercises and dissertation research.

We propose that fees for both home and overseas students will be at the standard level for postgraduate classroom-based programmes.

The programme will be publicised initially, using our own resources and with the help of the University Communications & Marketing unit and International Office, through

- University publications and website;
- ISSTI’s website and newsletter;
- ISSTI’s database of national and international contacts in academic, government and non-government organisations;
- STS, policy studies and related e-mail lists;
- appropriate commercial and other degree listings;
- selected national print advertising;
- the University’s overseas student recruitment agencies;
- the British Council.

In future years we shall also seek endorsements from alumni, their employing bodies and other agencies, and explore with major government agencies schemes under which employees could be sponsored on the programme.

**Market and existing programmes**

We have engaged Prof. Fred Steward, Professor of Innovation and Entrepreneurship at Brunel University, as external assessor for the proposal, and, within the constraints imposed by the development strategy, have already attempted to take into account his initial observations on the initiative in revising this proposal.

Beyond discussing the programme aims and content with current students and alumni from our own MSc and similar programmes in the UK and Europe, we have not undertaken elaborate market research. We were not convinced that the methods readily available would for the costs entailed have produced much useful information nor justification of our target enrolments, and decided instead to rely on the incremental development strategy outlined. We shall, however, attempt to explore in the coming months levels of demand, student requirements and publicity options in specific countries, via the International Office and its overseas student recruitment agencies and through our own contacts. We shall also use the first student intake to evaluate the programme and explore changes in content and publicity.

The landscape of Masters programmes in the UK and Europe with overlapping, similar or nominally similar focuses is complex and rapidly changing, and it is important in considering comparators and competitors to make some distinctions.

While it will cover some of the same theoretical ground as programmes in Science and Technology Studies, like the current Edinburgh MSc STS, the MSc in Science, Technology, Medicine and Society at University College London, and the MSc in Innovation Studies at the University of East London – and indeed that basis in the latest scholarship in STS will be one of its distinctive features – the proposed programme has a
different orientation to these programmes in catering for policy and management practitioners rather than those seeking an academic career path.

Most common among the more vocationally orientated postgraduate degrees are programmes in technology management, which mostly have a much narrower focus on management processes and issues internal to technology or research-based enterprises or entailed in adopting and managing technology in firms and other organisations. These are markedly different from the proposed programme in that they have a less developed basis in social studies of technology and other areas of social science, and often aim to provide management training for engineers. Programmes with this emphasis in the UK include:

- MPhil in *Innovation, Strategy and Organisation* and MPhil in *Technology Policy* at the University of Cambridge
- Postgraduate Diploma and MSc in *Technology Management* at the Open University

and elsewhere in Europe:

- MSc in *Innovation Management* at the Technische Universiteit Eindhoven
- MSc in *Management of Technology* and in *Engineering and Policy Analysis* at TU Delft

There are no Scottish programmes close to the proposed MSc and that could be considered to compete with it. Elsewhere in the UK, the proposed programme, with its integration of science, technology and innovation issues and its substantial basis in STS approaches, most resembles

the overlapping suite of programmes at the Science Policy Research Unit (SPRU), University of Sussex, particularly the MSc in *Public Policies for Science, Technology and Innovation*, in *Science and Technology for Sustainability*, and in *Technology and Innovation Management*

- MSc in *Management of Science, Technology and Innovation* at Manchester Business School
- MSc in *Science and Technology Policy* at the University of Liverpool Management School

Elsewhere in Europe there are a handful of comparable programmes. Some of these operate as specialisations within STS degrees, and are thus not very visible to the practitioner audience we are aiming at. While some, particularly inter-university programmes, are taught primarily in English, several require fluency in another European language particularly to take specific specialist courses. Examples include:

- Master in *Engineering Policy and the Management of Technology* at the Center for Innovation, Technology & Policy Management, Instituto Superior Técnico, Lisbon
- MSc in *Technology and Policy* at the Technische Universität Eindhoven

specialisations within the cooperative STS Masters programme run by the European Inter-University Association on Science, Technology and Society (ESST), such as

- *Innovation Economics, Public Innovation Policy and Innovation Strategy* at Linköping University
- *Economics and Management of Innovation and Technology Policy* at the Autonomous University of Madrid
We consider the SPRU programmes point to the size and character of the market. The *Public Policies* ... programme takes 10-20 students per year, the mix fluctuating but typically half domestic and half overseas students, the latter mainly from English-speaking countries such as the US and Canada. It draws students from a mix of social science, management, natural science and engineering backgrounds. The *Technology and Innovation* programme takes 20-30 students a year, mostly overseas, mostly from Latin America and Asia, and with technical or management backgrounds. The *Science and Technology for Sustainability* programme takes around 7 students a year, mostly from the UK and some from continental Europe.

Most of the SPRU students come from employment rather than straight from first degrees – typically in their mid 20s and a few years into a career.