Implementation Plan for Distance Learning Material Development and Delivery in the Global Open Agriculture and Food University

Discussion Paper

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Contents

1. Introduction and Objectives

The idea behind the Global Open Agriculture and Food University (GO-AFU) is to provide professional and applied academic postgraduate courses in partnership with regional and national institutions to enhance agricultural research and analytical capacities in developing countries. The initiative is aimed at strengthening the capacity of developing-country institutions, researchers, other working professionals, and postgraduate students in agriculture (including livestock, forestry, and fisheries) to enhance agricultural development, poverty alleviation, and food security. The GO-AFU program is a distance education initiative of the Consultative Group on International Agricultural Research (CGIAR) centers.[1] Distance education is a cost-effective and efficient way to strengthen capacity in developing countries by providing high-quality teaching for students and other professionals. The GO-AFU will be characterized by its openness[2] on the supply and the demand side.

The CGIAR system has important human and physical assets that will be used in building the GO-AFU. A large pool of scientific personnel and an extensive amount of learning material exist and will be available to the GO-AFU. One of the aims of the GO-AFU is to integrate existing CGIAR course modules with other training material, convert this material into distance learning teaching modules, and provide these modules to trainers, teachers, and students in collaboration with national and regional universities.

This paper outlines an adaptation process that will enable the use of traditional learning material in distance learning courses. For the GO-AFU initiative, common standards for the adaptation of material are necessary to ensure high quality. Future course developers must give some thought to the nature of the courses, the teaching methods, the assessments, and quality assurance. Course developers will include not only researchers, trainers, and other experts from the CGIAR centers, but possibly also personnel from universities, other research centers, and international organizations—all can act as "global developers" of distance training courses. This paper will help potential course developers understand the process of integration, modification, and adaptation of existing CGIAR-center learning resources into distance learning materials, as well as the process of delivery.

[1] More information on the initiative is provided in the program proposal, "The CGIAR Initiative for a Global Open Agriculture and Food University," May 2004.

[2] The GO-AFU has been conceived as an open-source system. A key characteristic of an open-source system is that property is configured fundamentally around the right to share and distribute, not the right to exclude. The content of the system will be freely available for modification, use, and redistribution, with certain restrictions for quality control and on commercial use.

2. General Framework for Distance Learning Training Material Development

For distance learning courses, is it enough to take traditional training courses and make them available on CDs or online? The answer is, in general, no, because even if the content is the same as in a previous face-to-face course, some redesign of the training material will be necessary in order to make it appropriate for distance learning. The learning activities will be different—as will the interactions, the length of time allocated for each activity, the assignments, and the evaluations.

a) The Nature of Distance Learning

Distance learning refers to situations in which learners are physically separated from the educational provider, communicating in writing (by postal mail, e-mail, fax, or computer conferencing), verbally (by telephone, audioconferencing, or videoconferencing), or in – periodic tutorial sessions (Perraton 1988; Lockwood and Goolesy 2000). Distance learning courses are not like traditional face-to-face courses. They require different media, delivery methods, course design, evaluation methods, and learner-support structures (COL 1999).

Adaptation is the process of modifying learning materials from their original form to a form usable for distance learning. If materials are designed specifically for a particular learner population in a particular context, they may be totally unsuitable for use with a different learner population or in a different environment. The process of learning-material adaptation involves facilitating the material's effective use in a different context with different learners (COL 1999).

b) The Structure of Courses and Degrees in the GO-AFU

Before examining various aspects of the course development process, a common understanding of course and degree structure is required. The objective of the GO-AFU is to offer graduate-level courses that can apply toward master's degree programs. Table 1 contains an overview of the basic components and requirements of courses and degree programs.

Traditional master's course at an agricultural university	**Distance learning master's course (GO-AFU)**	**Components of a master's degree program (GO-AFU)**
• 3 credits • 3 teaching hours per week • 3 hours of course work /week • Length: 15 weeks • Estimated study time: 90 hours	• 3 credits • 6 hours of student activity per week • Length: 15 weeks • Estimated study time: 90 hours	• 42 credits required • 12 MSC courses: 9 required, 3 in areas of interest, incl. fieldwork (total of 36 credits) • Master's research project (6 credits)

Table 1: Basic components and requirements of course and degree programs

3. The Pillars of a Curriculum Development Plan

The development of curriculum for distance learning has both a pedagogical and a technological side. On the pedagogical side, the course developer must consider the student characteristics, course topic and objectives, course content, teaching and learning activities, and course assessment and evaluation. The general technological approach of the GO-AFU will be the creation of an open-source system. The open-source approach ensures the development, distribution, and accessibility of the best available materials. The two approaches, pedagogical and technological, are interrelated (see original conceptual paper).

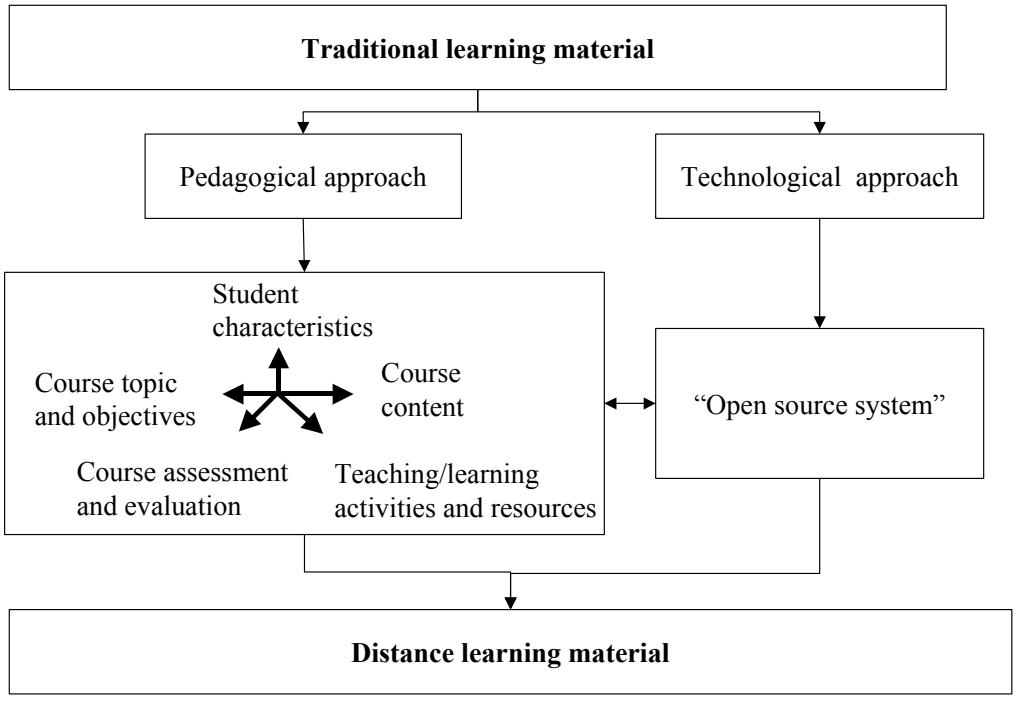


Figure 1: Adaptation of Traditional Learning Material to Distance Learning Material

The adaptation of traditional learning material into distance learning material can be conceptualized as shown in Figure 1.

a) Student Characteristics

In the first phase, the target students of the GO-AFU will be master's-level students at developing-country universities that have incorporated GO-AFU modules and courses into their academic programs, those who wish to obtain skills in technical fields to complement their degree programs, and those who choose to enroll in a complete degree

program. In addition to this target group, the GO-AFU will also accept developing-country teachers, researchers, and technical professionals who wish to upgrade or augment their skills; these individuals may come from academic institutions, government agencies, nongovernmental organizations (NGOs), or the private sector.

The educational backgrounds of students, and their skills, will vary from country to country and from region to region. The course developer will know very little about the subject-specific knowledge of the students, their skills in using technology, or their practical experience in the field of study. For example, some students will be familiar with using computers and the Internet while others might not have used these technologies before. Course developers should expect students to have some basic knowledge of the subject and some technology skills, because they are enrolled in a master's program. However, the students' skills in using the Internet or material on CD-ROM might be very limited, so support and help (e.g., how to install a plug-in, how to check a connection, and so on) will be necessary.

Cultural background, which affects how students think, learn, and work, is another critical student characteristic. The GO-AFU will be accessible from all continents; therefore, students will have very diverse cultural heritages and attitudes toward learning and education.

b) Course Topic and Objectives

Before a course developer converts course material into a format appropriate for distance learning, he or she must reflect on the course topic and objectives. Why? The topic of an existing training course might be relevant for a group of professionals in a single developing country, but not for a broad range of students in different countries. The topic and the contents must be general enough to enable adaptation to local circumstances in different countries. The objectives reflect the potential outcome of the training and will give students an idea of their learning opportunities.

Defining the course topics and objectives will be an interactive process involving the GO-AFU coordination center, the CGIAR centers, and the universities in the developing countries. A need assessment, conducted prior to the development of the first courses, will show the most urgent needs of the universities. In the first two years of the GO-AFU, only a few course topics will be covered, but further courses will be developed and offered over time. All CGIAR centers can take the initiative to develop course material in their fields of activity. The objectives of the courses, which should be accurate, easy-to-understand, and meaningful, will be set by the course developers.

c) Course Content

The fundamental element of every distance learning course is the content, which is summarized by the course topic and objectives. The developer of a distance learning course must be aware of the differences in roles and delivery modes. In a traditional

training environment, the trainer will develop, structure, and present the course (content). In the distance learning setting of the GO-AFU, these roles will be separated. The course developer will put the course together; however, the presentation will be without his or her involvement and will instead be supported by a course facilitator (e.g., a local professor or teacher). The facilitator will also be responsible for local adaptations of the course topic, objectives, and content.

In general, the course structure and the coverage of the topic should be neither too extensive nor too limited. Furthermore, the course content must be up to date, incorporating the latest research on theoretical concepts and empirical studies. The course content should encourage and motivate thinking by students, and the level of difficulty must be appropriate for the target group.

A course unit can consist of an overview, unit objectives, several sections of content divided into subsections, interactive questions, a summary, self-assessment questions on the whole unit, and a list of additional reading materials.

Distance learning materials should meet certain quality standards, which can be assessed in four different categories:

- Curriculum content quality: appropriate scope, depth, and level of difficulty of course content
- Production quality: appearance and layout of the material, ease of reproduction
- Format: grammar, spelling, visual appeal, and language level
- Completeness: whether all features generally associated with "good" distance learning materials are present, such as identified learning objectives and coverage of all important aspects of the topic

d) Teaching/Learning Activities and Resources

Generally, distance education courses are made up of a number of course components or learning materials, which can include any of the following: teaching texts, study guides, course guides, readers or anthologies, assignments (with or without an accompanying tutor guide), television broadcasts or videotapes, radio broadcasts or audiotapes, software or online information and data, CD-ROMs, textbooks, and laboratory materials. In addition, some student support may be provided, either through personal communication at local universities or through online student tutors. Both the media used for distance learning and the student support arrangements affect the possible level of interaction in a distance learning course (see Figure 2).

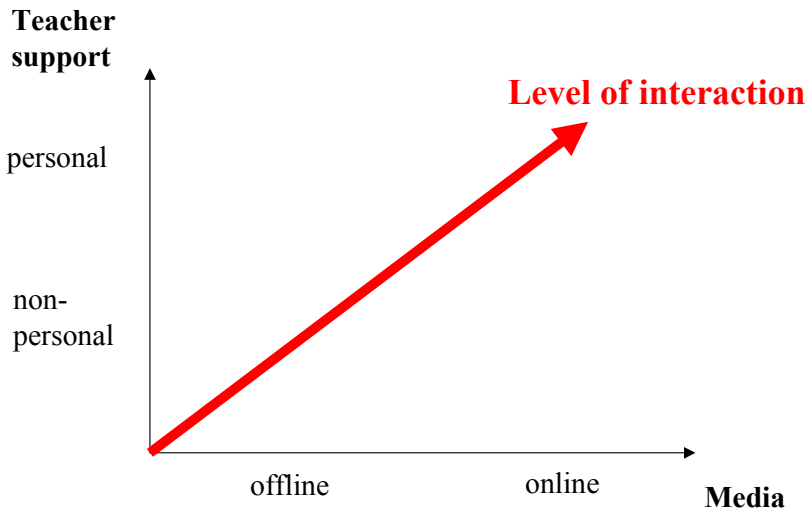


Figure 2: Factors influencing the level of interaction in distance learning

The level of possible interaction is an important issue because it influences many factors, including the course assessment and the learning resources. In general, as in traditional training, learners need feedback and reassurance. Even if there is no personal contact, some other contact mechanism must be in place. If students can interact personally with the course facilitator, there are more interaction opportunities than in a course delivered on a CD to a student without Internet access.

The delivery of material will depend on the student's access to a computer and/or the Internet. In the GO-AFU, the courses will be delivered online or on CD to the local universities. For all courses, a folder with the course content and the readings will be prepared by the GO-AFU and sent to the students. A recent survey by the Open University in Britain showed that students spend more time with printed text than any other medium. Students rated CD-ROMs more highly than any other electronic medium, especially when the CDs contained interactive material (Wyeth 2002).

Furthermore, the learning material must come with an agenda and a time sheet. Students need to know what is on the agenda and the performance objectives. All learning activities must be planned to ensure that the students will have a positive learning experience. Facilitators will develop learner support structures for the GO-AFU courses.

Problem-based learning and reflection on the process and content of learning should be encouraged. It is easy for distance learners to become passive because they are working independently. Sending students manuals to read will not accomplish learning, but having the students discuss topics among themselves, defend positions, investigate topics, and apply knowledge may be more effective. Participation should be encouraged and eventually graded as well. If a course includes discussion and teamwork to enhance student learning, this will take more time than in a face-to-face situation because students respond asynchronously.

The local facilitator support model has some limitations. First, local professors and teachers may not have the necessary knowledge themselves to support the course. They might also lack the willingness, time, and financial resources to provide this type of support. Second, interested students could take GO-AFU courses only when enrolled at a local university, and professionals would also be excluded from course assistance when not enrolled. The local universities would have to establish regulations to enable these groups to participate.

Another approach, which would address these limitations, would be to build up a central student facilitator center, managed and controlled by the GO-AFU coordination center. Such a center would ensure that GO-AFU courses do not become exclusive and limited to a small group of students, and it would also open the opportunity to have students from developed countries take some courses and pay for them.

e) Course Assessment and Evaluation

Course assessment has a significant impact on learners and their progress. Assignments should be consistent with course content and objectives and be manageable in the time allocated, with the resources and technologies available to the learner. Assignment tasks should enable learners to pursue some of their own interests or apply their learning to a practical situation or their own context. Possible assignment types include the following:

- Essays or reports
- Multiple-choice questions
- Individual or group work on case studies or scenarios
- Discipline-specific problem solving (mathematics, science, engineering)
- Video demonstrations or on-site meetings
- Developing a database or annotated bibliography
- Projects
- Simulations
- Experiments

Regardless of the form of the assignment, feedback on a learner's assignment is always necessary. In response to multiple-choice questions, the feedback can be an automatic message from the learning system. For most of the other assignment forms, more specific feedback is necessary. The course developer will provide guidelines, questions, and suggestions for course assignments, and the local facilitator will be responsible for course assessment and grading.

The evaluation is an indication that the educational institutions and the GO-AFU care about quality issues, such as the effectiveness of the course, admission standards, and completion standards. Evaluations should be performed regularly, be easily accessible, and be created with an eye toward the students. There are two main types of evaluations: formative and summative. Formative evaluations are ongoing throughout the distance learning course and the instructional process. In the distance learning environment, an instructor might have an online evaluation form that focuses on the course's strengths and

weaknesses, technical/delivery concerns, and content areas in need of further coverage. In the GO-AFU, this will be the task of the course facilitator. A summative evaluation is conducted upon course completion to determine the overall effectiveness of the class. The focus is on student performance, course relevancy, learner attitudes toward delivery methods, and the instructor's teaching style and effectiveness. The summative evaluation can be jointly organized by the course facilitator, the course developer, and the GO-AFU coordination center.

f) Summary

All the individual pillars, such as student characteristics, the course topic and objectives, the content, the teaching and learning activities, and the course assessment, are important elements of a course development strategy. Clearly, course development for distance learning is a complex and challenging task. For each pillar, some guideline questions are outlined in Table 2 to help in course development.

Pillar	Guideline questions
Student characteristics	• What is the students' knowledge of the subject? • Are the course requirements clearly specified? • Are the learning results defined? • Does the course match the requirements identified in the needs assessment? • Do students have the necessary IT skills? • Is regional adaptation of the course necessary and possible?
Course topic and objectives	• Is the course topic appropriate, relevant, and adapted for students in developing countries? • Are there any controversial ethnic, religious, or cultural topics? • Is the topic relevant to agricultural development in developing countries? • Does the topic reflect the CGIAR centers' comparative advantages? • Can it be expected that local professors are familiar with the topic?
Course content	• What material is readily available for the various parts of the curriculum? • What additional material is necessary for the various parts of the curriculum? Where can you get these materials? • Does the course cover the right content and is the coverage extensive enough? • Is the content up to date? • Is any important content missing, which might be of importance for the target group? • Is the structure of the content flexible? Can it be divided into logical smaller segments for conversion into digital learning material? • Is the level of difficulty right for the learners? • Will the content need to be adapted to local conditions? • Will the course be accepted by students, and will they learn from it? • How long will it take students to study the materials?
	• What is the best format for your course? Print? Other media? Web-based?

Teaching/ learning activities and resources	• Is the course suitable for the delivery mode (e.g., online, CD-ROM, print material)? • Is the printed course reader easy to prepare? • What is the best approach for the course (exploratory, problem-based)? • Is the material presented in a clear and understandable way? • Are different methods of presenting material used to correspond to different learning styles? • Does the course provide opportunities for student/instructor interaction or student/student interaction? • Are there opportunities for learning through doing, collaborative learning, or other types of activities? • Are the learning activities clearly defined and manageable?
Course ssessment	• Can the course assessment be with the provided resources? • Is the course assessment open questions, questionnaire, assignments or other methods? • How much time will students need to prepare coursework and exams? • What is the grading system of the course? Are guidelines for grading provided? • How will the course evaluation be organized? Will it be summative or formative? • Is the method for course evaluation appropriate for the topic and the length of course? • Are the course assessment and the evaluation transparent for the students?

Table 2: Guideline questions for course development

A reflection on these guidelines will deliver the ingredients for a good distance learning course. The course developer can now prepare a course proposal, which will include the following:

- Course objectives / aim of the course
- Relevance of the topic to the students
- Executive summary of the topic
- Background (e.g., readings)
- Requirements
- Course media
- Study calendar and timetable
- Course work and assessment

The course proposal should be sent to the GO-AFU coordination center for review. After the review process, feedback, and possible modification, the course developer can develop the course. The GO-AFU coordination center will act as a moderator in the development process, be responsible for quality assurance, and provide technical resources and assistance.

4. Support for Course Developers

Course development will not always be an easy and smoothly running process. Writers may initially be reluctant to accept the need to develop materials in the distance education format, and writers, reviewers, and editors may not be highly motivated. Due to the voluntary nature of contributions, however, these problems appear to be manageable. The driving force behind the GO-AFU is not benefits for course developers, but the motivation to share knowledge to enhance agricultural education in poor countries. A high level of intrinsic motivation will also help to overcome the time problem in course development. Preparing the course proposal and developing the learning and teaching material will be time consuming. A realistic time frame for developing and delivering one course is 10 weeks. (Please refer to Appendix E for more details on this process.)

A support structure for course developers will be established. One element will be a course-writing workshop to train writers for this specific function. The coordination center will also help with organizational and technical problems. After the first year a course has been taught, the feedback from students and course teachers will provide valuable input for course improvements and modifications. A quality control mechanism will also be established, reflecting an appropriate set of quality measures. These will include benchmark measures for

- institutional support (e.g., the reliability of course delivery and technology),
- course development (e.g., the periodic review of instructional material),
- teaching/learning (e.g., the constructive and timely feedback on student assignments and questions),
- course structure (e.g., a clearly written, straightforward course outline),
- student support (e.g., students' access to technical assistance), and
- other means of evaluation (e.g., enrollment numbers and costs are used to evaluate program effectiveness).

The results of the quality review will be provided to the course developer.

5. The Organization of Course Delivery in the GO-AFU

Once course components or learning materials have been identified, certain steps must be taken to ensure that they can be legally used. One important element in the process is the identification of the most appropriate type of transfer arrangement (COL 1999).

All course delivery arrangements require contracts. A legal contract protects both the producers and the users of the material. A contract allows producers to control the work they own or have created, while users know exactly what they can use and how they may use it. Both parties must know their responsibilities and the considerations involved. There are a variety of possible transfer arrangements; the most common are outlined below.

- *Direct sale of the learning material*

The user can use the material how he or she likes, within the constraints of international copyright conventions. The producer usually provides no additional support or assistance.

- *Permission to use*
  The producer allows his or her material to be used by another in some way, without charge. The producer may be able to specify certain conditions for use (e.g., use by universities in developing countries only).

- *Licensing arrangements*
  The producer grants a license for the user to use the material for a specified period of time, with certain obligations on the part of the user and the producer for the duration of the contract. The license may be exclusive in a specific region and may permit the materials to be modified, adapted, reformatted, or translated in some way. It may be possible for the user to sell the rights to these new materials to others.

In addition to the legal side, another important element in conceptualizing the course delivery process is to determine how outreach to the program's target group will be organized. The GO-AFU may be able to learn effective ways to organize course delivery from existing traditional and virtual universities around the world. How do they organize the course delivery process? Appendix B contains an overview of approaches by agricultural universities and MIT. The MIT approach is to make all courses taught by MIT staff available online, including course assessment, case studies, and other related course work. Download is possible without any cost, and no support is provided by MIT. The courses are nonexclusive. The intention of traditional universities is to offer distance learning degree programs, often parallel to on-campus programs. The university staff support on-campus students and distance learners at the same time. Students must fulfill the entry requirements to start the program, and they must pay tuition. In general, the courses are exclusive.

What will be the best way to organize course delivery in the GO-AFU? Courses could either be delivered by local universities in developing countries or—alternatively or simultaneously—from the GO-AFU coordination center directly to the students.

a) Course Delivery through Local Universities

Course delivery through local universities would be designed to enhance the quality of teaching and research at developing-country universities that might not be able to offer the courses due to limited human, financial, and technical resources. The GO-AFU and the local universities would agree in a contract that the university could use the course material developed by the GO-AFU. This approach would assure that the courses could be developed in a way that would meet the countries' needs. The local faculty would have a substantial role in course design, delivery, and student tutoring and support. Students would be able to complete a course with local assistance and without having to travel to the GO-AFU headquarters.

In this model, both the registration process and the establishment of student requirements would be the responsibility of the local universities. Student requirements include the necessary educational background, language skills, or required practical experience for attending the university. Local universities could limit participation in the courses to their master's and PhD students. However, they could also open the courses to interested professionals in the country and organize course participation for them.

As mentioned, local staff would be able to adapt the courses to specific requirements in certain countries. The amount of flexibility for adaptation would be determined by GO-AFU regulation. Without any regulation, quality assurance regarding the content and impact would become almost impossible. The GO-AFU should be confident that its standards are being upheld at all times.

The local universities would determine the means of teaching and learning. They could organize course delivery in such a way that students need not come to the campus at all, or students could come together on a regular basis (e.g., for fieldwork or course assessment). Therefore, students would not necessarily rely only on distance access to the training material (e.g., the Internet or CD-ROMs) and on distance support. Training could also be provided to assist students in using information technology.

Through accreditation arrangements, distance learners could acquire credits recognized by local universities. For example, a student in Nigeria might take a course developed by the GO-AFU and delivered by a local university. In such a case, the GO-AFU would be responsible for the provision of materials and possibly for marking some of the course assignments (depending on the course support structure and the local resources). The final course assessment as well as course subject tutoring would be the responsibility of the local university.

The current outline of the program indicates a possible tuition fee for a complete master's program of US$2,000. On this basis, the tuition for one course can be estimated at approximately US$200. The financing model for a decentralized approach to course delivery would foresee that the GO-AFU and the local universities would share the tuition equally. The local university would be responsible for tuition administration.

Potential restrictions and problems on the local level include the following:

- University personnel might not be eager to take on more work because, with departments understaffed, they already have heavy teaching loads.

- University personnel might not be able to organize course administration.

- The use of computers and Internet technology is likely to cause higher costs in developing countries compared to developed countries. The costs of computer hardware and software are relatively higher because of import taxes, international shipping, and other costs.

- Skilled instructors and technicians may be more expensive in developing countries because of the very limited supply and competition from the private sector for their expertise. Faculty members at universities are likely to need training, which will also result in additional costs.

- Distinct cultural, linguistic, and other pedagogical needs of students in many developing countries may raise costs further.

b) Course Delivery through the GO-AFU Coordination Center

Another possible way to organize course delivery would be to consolidate the process at the GO-AFU coordination center. The center would be in direct contact with the students all over the world. The course delivery would be online or via CD-ROM, accompanied by a print folder. The GO-AFU would administer the registration process.

This approach would foresee that the GO-AFU would build up a team to provide student services, learning resources, and academic staff. The GO-AFU institution would be entirely responsible for the courses: for marking student assignments and examinations, for providing tutor and student support services, and for ensuring that the students receive the appropriate materials.

The student support services could be decentralized within the CGIAR system. The responsibility for course development (in cooperation with the research staff) and possibly also student support and course assessment could be assigned within each of the CGIAR centers. A centralized approach with the GO-AFU team based in one location would also be possible. In either case, student support would require many resources and a large network of tutors. To cite one example, the Open University in Great Britain assigns one tutor to a group of 15 to 20 students. The tutors are paid and recruited in an open competition for different regions. In this case, a course offered to 300 students would require more than 20 tutors for student support, course assessment, and evaluation.

Students in one course could come from Africa, Asia, and South America at the same time. Therefore the adaptation of the course material to local conditions might be restricted. Quality control over the courses would be less complicated than that in a system of course delivery through local universities. Local coordination with universities, governmental institutions, research organizations, and NGOs could play a major role in the delivery process. The program must be open to strong local participation where desired, and it must find other ways to ensure local relevance elsewhere (following the principle of local adaptability). The proposed program of the GO-AFU would be flexible enough to allow some variation in the participation of local faculty and other aspects of course delivery.

If universities around the world gain confidence in the course standards and quality, they might agree to grant credit for the course even though they are not involved in the actual course assessment or delivery. The GO-AFU would grant a certificate, not a degree. The

GO-AFU will begin by offering individual courses in high-demand subjects and gradually develop the full range of courses needed for a degree. The degree-granting mechanism and the accreditation are subject to further discussion.

In this approach to course delivery, the GO-AFU coordination center would be responsible for course administration and for receiving the students' tuition fees. Compared to the other approach, more financial and human resources would be necessary. A budget plan, including the costs of both approaches, should be developed.

In both types of course delivery, the main role of the GO-AFU is to generate learning objects (courses and modules). The GO-AFU offers a content repository and a concept for implementing the courses. The drivers in course development should be the local and regional partners. A "bottom-up" approach will help match the needs of the beneficiaries and ensure the sustainability and effectiveness of the program.

Table 3 compares various common approaches to course delivery

	Virtual education by traditional universities	**MIT approach**	**GO-AFU delivery through coordination center**	**GO-AFU delivery through local universities**
Course developer	Professor	Professor	Professor or professional	Professor or professional
Study packages	Yes	Yes	Yes	Yes
Student entry requirements	Yes (usually the same as for regular students)	None	None	Yes, set by local universities
Fees	$10,000–20,000 for master's, $500–2,000 per course	None	$2,000 for master's, $200 per course	$2,000 for master's, $200 per course
Grades/assessment	Yes	None	Yes, possible	Yes
Student facilitation	Student service center	None	GO-AFU coordination group	Local universities
Possible interaction	Medium-based and personal	Medium-based	Medium-based	Medium-based and personal
Exam	Local centers (some also in foreign countries)	None	CGIAR regional facilities	Local universities
Certification	Yes, by traditional universities	None	Yes, GO-AFU certificate	Yes, by local universities
Student schedule	Fixed (semester)	None	Flexible	Set by local universities
Openness	Registered students	No restriction	No restriction, possibly requirements	Restrictions likely (only for local students)

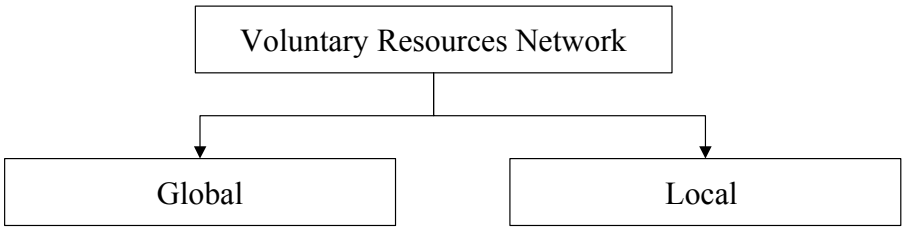
Table 3: Comparison of various approaches to course delivery

6. Voluntarism and Donor Support for the GO-AFU

The GO-AFU will be structured as an open-source institution: teaching resources and course contents will be shared with any interested educational institution. Therefore, the GO-AFU intellectual products will be available for universities and also individuals to use, improve, or customize for local conditions. It will be a basic principle that everyone will be allowed access to the learning material, under the rules of intellectual property laws. Any changes to the course material must be documented and reported. The GO-AFU community can select and incorporate the innovations, changes, and modifications that improve the common product in such a way that everyone participates and benefits.

The open-source approach is likely to attract substantial voluntary input in developing and improving the course material. The motivation for this input may simply be the need to adapt courses to local conditions, but it may also include a strong belief in the vision and objectives of the GO-AFU approach or the desire and opportunity to contribute to innovation and improvement of GO-AFU courses. Personal commitment to the vision and objectives of the GO-AFU will be a powerful driving force in the development of the program—perhaps even more important than money.

The GO-AFU will serve as a catalyst for building coalitions, for developing a consortium of distance learning institutions for agricultural capacity enhancement, and for coordinating voluntary input. Altruistic motives can lead to the voluntary contribution of resources (e.g., technological, logistical), labor (e.g., in course development and student assistance), or money (e.g., scholarships for students, financial support for universities). The project will need substantial financial input, of course. Effectively using voluntary and donor contributions will require a clear communication and budgetary strategy. Voluntary resources can be brought in to the GO-AFU on the global and local level.



Some examples:
- A university professor from the US will offer a course
- PhD students will help master's students
- An NGO will sponsor students
- A company will provide the distance learning platform for free

Some examples:
- Local NGOs will support students, so that they can attend universities
- Governments will provide technical infrastructure
- Local experts will facilitate courses

Some examples are outlined in Figure 3.

Figure 3: Global Resource Network in the GO-AFU

A global voluntary resource network will be established to enhance contributions to and benefits from the open learning system. The GO-AFU concept will help to stimulate voluntary contributions by encouraging people to participate, by providing opportunities for information generation and exchange through a network of volunteers, and by taking all contributions seriously.

The open-source framework of the GO-AFU will provide many opportunities for participation, not only for educational institutions at the global, national, and regional levels, but also for various traditional and nontraditional donors. Donors can contribute to the development and maintenance of the GO-AFU institutions, to capacity building at national and regional universities, and also to student participation and support. The relationships between the stakeholders in fundraising and course delivery are outlined in Figure 4.

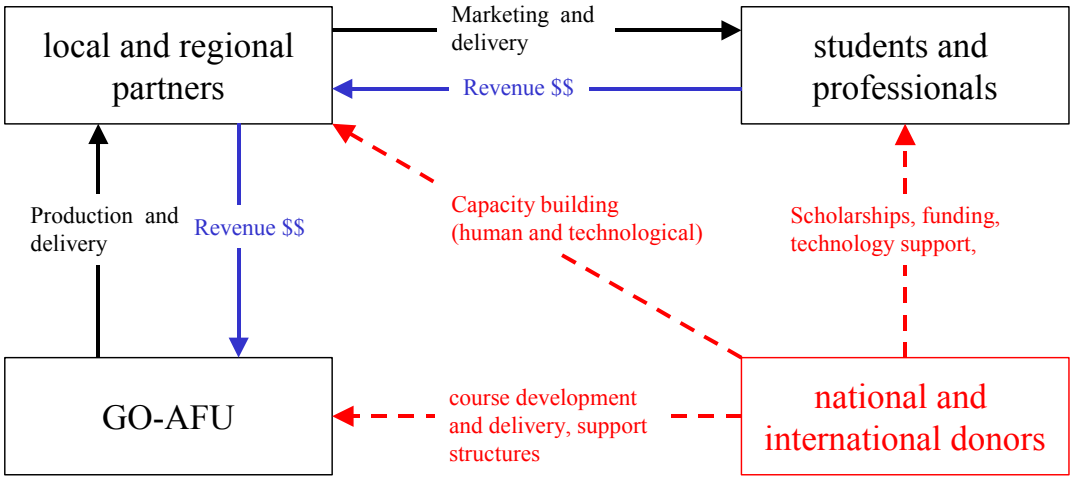


Figure 4: Options for donor support

7. Summary

This paper is summarizing the current discussion on course development and delivery in the Global Open University. It clarifies the pedagogical approach to course development by outlining the main pillars student characteristics, course topic and objectives, course contents, course assessment and the teaching and learning activities. For the course delivery, the potential delivery modes for the GO-AFU are discussed. The paper concludes with comments about voluntarism and donor support about the processes course development and delivery.

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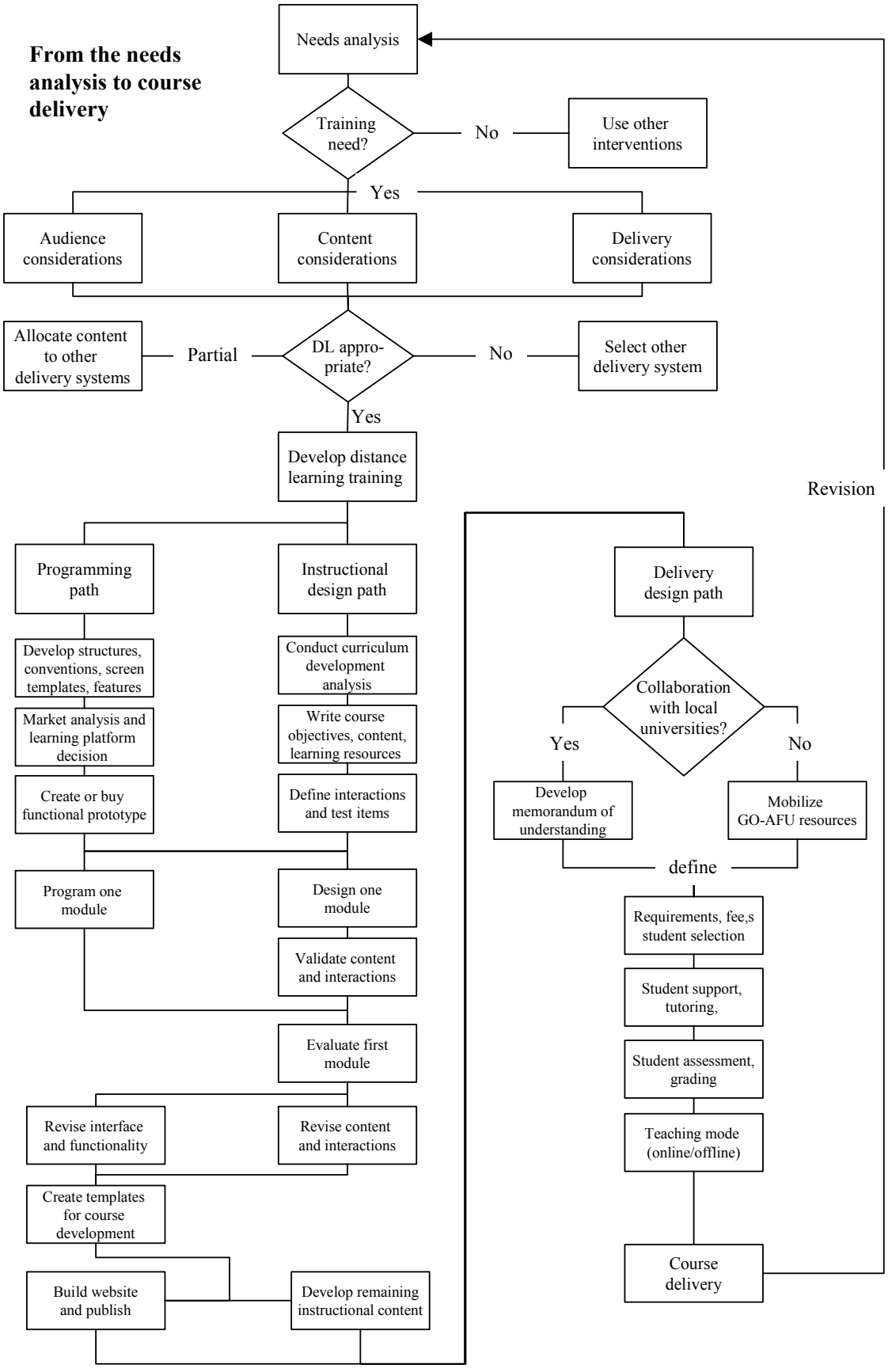
9. Appendixes

Appendix A: The Steps from the Needs Analysis to Course Delivery

From the needs analysis to course delivery



Appendix B: Distance Education in Agriculture: The Concepts of Other Universities

This section provides an overview of different approaches to distance learning in agriculture. The intention is to compare these approaches with the GO-AFU concept.

Imperial College London (www.wye.imperial.ac.uk/)
The distance learning program of the Imperial College is one of the most advanced programs currently existing. It offers postgraduate study programs in the following thematic areas: environment, biodiversity, sustainable agriculture, rural development, applied economics, and food chain management. Currently more than 900 students from more than 100 countries are enrolled. Students have the opportunity to take one or more individual courses for continuing professional development purposes. In the next study year, Imperial plans to offer more than 50 individual courses. Imperial also offers a range of MSc or postgraduate diploma degrees (PGD), including the following:

- MRes and PDG in plant biotechnology
- MSc and PDG in agribusiness for development
- MSc and PDG in agribusiness management
- MSc and PDG in agricultural economics
- MSc and PDG in applied environmental economics
- MSc and PDG in biodiversity conservation and management
- MSc and PDG in environmental management
- MSc and PDGin environmental science and management
- MSc and PDG in food chain management
- MSc and PDG in managing rural development
- MSc and PDG in sustainable agriculture and rural development

Students have access to the open learning platform and receive (in print form) a detailed study guide that includes exercises, assignments, and other activities, along with books and other published materials together with integrated volumes of readings. Assessment for each individual course is by final written examination. These examinations are held in the country where the student lives, using the University of London's international examination authorities and centers worldwide. Costs of attendance are the responsibility of the examination candidate. A research report is a requirement for MSc students.

An MSc within one of the thematic fields of study requires the successful completion of nine modules, some of which are compulsory, and a research report. For a postgraduate diploma, students must take eight modules, some of which are again compulsory. The study time required for each of these modules is, on average, about five hours per week over a period of 31 weeks. The study calendar starts in mid-February and runs for 35 weeks.

The qualifications required for postgraduate diploma and MSc registration are the same as for internal students at the University of London (i.e., for the MSc a good degree in an appropriate discipline accepted by the university; for the postgraduate diploma either a degree or a technical or professional qualification and experience considered appropriate

and relevant by the university). Students who begin with a diploma can transfer to the MSc program if they do well.

Total fees for the MSc program are £7,340 (US$13,500), and for the postgraduate diploma £5,750 (US$10,600). The fees are composed of a fee for each individual module (covering study materials, tuition, and examination) plus a registration fee. Individual modules are £800 (US$1,500).

Texas A&M University Distance Learning (http://mag.tamu.edu/)
The College of Agriculture and Life Sciences at Texas A&M University has designed the master of agriculture curriculum to prepare individuals for leadership roles in education, natural resource management, the extension service, and many professional careers in agriculture and life sciences. This is a nonthesis degree program that emphasizes the development of problem-solving skills and the practical aspects of academic course work. Students are enrolled as ordinary graduate students to participate in the degree program. The College of Agriculture currently offers the following distance degree options:

- MSc in agricultural development
- MSc in natural resource development
- MSc in wildlife science
- MSc in fisheries science
- MSc in poultry science
- MSc in plant protection
- MSc in plant science

Colorado State University (http://www.learn.colostate.edu/distance/dd.asp)
Colorado State University offers a distance learning–based master of agriculture in agricultural sciences, specialized in agricultural education. Offered by the College of Agricultural Sciences, this program is based on the need for graduate-level courses for professionals in agriculture who seek professional development or a graduate degree but are unable to relocate to the university campus to complete the degree. This program is a professional degree administered in cooperation with several departments, both within and outside the college. Interdisciplinary in nature, the program provides maximum flexibility in curriculum design. The degree provides a broader area of study than the more research-oriented master of science degrees offered within other departments. Programs are individually designed to meet students' professional needs and specific goals. Students may select Plan A, which requires applied research and a formal thesis, or Plan B, which requires a scholarly paper.

Iowa State University (http://masters.agron.iastate.edu/index.html)
Iowa State University offers a master's degree in agronomy through the distance education program. Individual classes can also be taken via distance learning. The following courses are required to complete the degree:

- Crop Growth and Development
- Chemistry, Physics, and Biology of Soils
- Climate and Crop Growth
- Crop Improvement

- Soil-Plant Environment
- Quantitative Methods for Agronomy
- Integrated Pest Management
- Crop management and Ecology
- Soil Management
- Crop Protection
- Agronomic Systems Analysis
- Current Issues in Agronomy
- Workshop in Agronomy
- Creative Component (master's thesis)

University of Queensland, Australia (http://www.aghort.uq.edu.au/distance.html)
The University of Queensland offers a bachelor of applied science in agronomy and in horticulture via distance education. A two-year diploma is also offered in the same subject areas. A study book delivered to the students contains all course content and directions for study and research activities. There is also a center, the Residential Schools at UQ Gatton, for practical segments. Exams can be taken at exam centers located Australia-wide. The students obtain the same University of Queensland qualifications as if they had studied full-time on campus.

MIT (www.mit.edu)
MIT's OpenCourseWare (OCW) is a free and open educational resource for faculty, students, and self-learners around the world. Use does not require registration. OCW publishes MIT course material; it is a not a degree-granting or certificate-granting activity, and access to MIT faculty is not provided. OCW supports MIT's mission to advance knowledge and education and to serve the world in the 21st century. OCW's goals are to provide free, searchable access to MIT's course materials for educators, students, and self-learners around the world and to extend the reach and impact of the "open courseware" concept. By 2008, all taught courses will be available online. In the meantime, MIT will publish the materials from virtually all of MIT's undergraduate and graduate courses.

Appendix C: Example of Course Outline for Agricultural Policy

Course Title:

Globalization and Food Security: Food and Agricultural Policy for Developing Countries

This course was held June 14–July 2, 2004, at the Royal Veterinary and Agricultural University (KVL), Copenhagen, with 30 students from developed and developing countries in attendance. This traditional existing course will be converted into a distance learning master's course consisting of various modules suitable for distance teaching.

The first step in the transformation process is to prepare the course outline, which will be based on certain assumptions about the technology and the cooperating university in a developing country.

Course outline

Course duration:	15 weeks (September 2005 to February 2006)
Study time:	90 study hours in total, on average 6 hours per week
Course is offered jointly by:	Agricultural University, Mymensing, Bangladesh Open University, Gazipur, Bangladesh
Course phases:	Phase 1: Course preparation: Test accessibility, media competence, and postage of CD-ROMs (July to August 2005) Phase 2: 15 course weeks Phase 3: Face-to-face meeting (3 days in December 2005) Phase 4: Delivery of course results and course test (February 2006)
Registration:	Please fill in the registration form on the course website. If you cannot access the website, please send an e-mail to registration@go-afu.com or contact the course facilitator.
Schedule of material delivery:	The training material on CD-ROM and a folder with all readings will be sent to you by post before the commencement of the course. Instructional materials will be sent to you via e-mail every Monday during the training period. If you do not have e-mail access, please contact the course facilitator.
Language:	English
Fee:	The cost for this course is US$200. This includes print and CD-ROM training material and tutoring time. Participants are responsible for their technology costs and for the travel and room and board costs for the face-to-face meeting.
Who the course is for:	This course is for 1. master's students in agricultural economics and agribusiness, 2. PhD students in agriculture, and 3. professionals working in the field of food and agricultural policy.
Course objectives:	The objectives of the course are to strengthen 1. the students' understanding of existing and alternative policy measures related to food security, agriculture, and natural resource management and how they affect the nutritional status

	and food security of various population groups as well as the agricultural sector and natural resources, and 2. the ability of the students to assess the effects of alternative policy measures within the area of food, agriculture, and natural resource management.
Course content:	The content of the course will include 1. past trends and the current status of and future projections for food security, including demand and supply, nutritional status, population, urbanization, and related variables; 2. the impact of globalization on agriculture, poverty, and food security; 3. basic relationships between government policy and food security, nutrition, and health; 4. gender aspects; 5. ethical aspects; 6. diet trends and their causes; 7. globalization, trade, and technology; 8. natural resource management; 9. markets, infrastructure, and institutions; and 10. consumer, producer, and government behavior.
Prerequisites:	In order to participate in this course you must be able to 1. access the Internet from a PC, 2. write basic documents in English, 3. navigate a website using hypertext links, 4. fill in and submit web forms, and 5. send and reply to e-mail messages. Furthermore, you must be enrolled as a master's or PhD student, and you should have basic knowledge of development economics. If you are a professional, please register and pay the course tuition fee. A letter of interest for this course, specifying your knowledge and experience in agricultural economics, is required.
Course literature:	Pinstrup-Andersen, Per, *Seeds of Contention*, IFPRI publications, 2001 Pinstrup-Andersen, Per, and Rajul Pandya-Lorch, *The Unfinished Agenda*, IFPRI publications, 2001
Places available:	50
How you will learn:	You will not feel like you are reading a textbook from a computer screen. The course will make use of various media. You can discuss the course, ask questions, and get support through the course mailing list from your facilitator and the other students.
What this course requires from you:	If you are new to self-directed learning, you may find this style of learning innovative—and a bit frightening. You can set your own pace; no one will nag you or criticize you for not participating in a class. You learn by participating actively. You alone are responsible for your own learning. That means you must have the drive and discipline to learn throughout the course and to manage the course assessments and the exam.
Time required:	You can take this course at your own pace, but completing it will require 6 hours of study every week. It is recommended that you interact with other learners and the facilitators. After you study the material, please attempt to complete each module immediately in order to improve your study efficiency.
Technical requirements:	This course will run on most operating systems (e.g., Windows 95, 98, NT, 2000, XP, or Linux). It requires the equivalent of a 200 MHz Pentium PC with 128 megabytes of memory. It runs in either

	Netscape or Internet Explorer browsers, version 4.0 or later. It requires no plug-ins, but to view and print the study lettersyou will need the Adobe Acrobat Reader (at least version 3.0—you can download it from http://www.adobe.com). You should also have MS Word or another word-processing program.
To get the most out of this course:	Do all the assignments. They do not take long and they let you practice what you have learned. Review the readings after you complete the assignments. The assignments will show how you can apply the readings. Participate in the discussion groups. Ask questions, debate issues, and help others.
Course assessment:	After 5 weeks and after 10 weeks, students must submit (via e-mail) an assignment. The assignments will be given out 3 weeks prior to the due date. The assignments will consist of case studies and questions. A final exam will take place at the end of February, for which students will have to come to the local campus. The assignments and the final exam will contribute equally (50%) to the final grade. You will need at least a D to pass the course.
Credits:	Successful participants will be awarded a Global University for Food and Agriculture (GO-AFU) certificate. Students can also get 3 credits for this course for their study program (master's or PhD).
Bonus:	After successfully finishing the course, you will become a GO-AFU alumnus.
Before you start:	You need to make sure that you have registered for the course and have received the course CD. Please review the prerequisites and the list of technical requirements to make sure that you meet them.
Course author(s):	This course was developed by Dr. Per Pinstrup-Andersen, professor at the Royal Veterinary and Agricultural University (Copenhagen), Cornell University, and Wageningen (e-mail: ppa@kvl.dk).
Course facilitator:	Your course facilitator will be: Prof. Friendly Help Tel.: 1234567890 E-mail: go-afu@friendlyhelp.com
Other support:	If you have any technical difficulties with the course material, please contact: Technical Help Desk E-mail: help-desk@go-afu.com
URL:	http://ifpri.com/go-afu/globalizationandfoodsecurity http://…
Other information:	We wish you a successful learning experience and a pleasant collaboration with your course facilitator!

The second step, after developing the course outline, is to consider the various course modules.

Description of course modules

Module 1: Global Food Situation, Food Security, and Agricultural Development in Sub-Saharan Africa

Abstract:	This module will provide an overview of the global food situation, the current status of food security in Sub-Saharan Africa, and the process of agricultural development in Sub-Saharan Africa.

Objective:	Students will learn the following: • Key statistics relating to food security in the developing world • Important production and price indexes to measure food security • Objectives in food security • Influence factors on food security • Priority areas of actions and actors • Trends in agricultural production • Macro-policy trends and their outcome
Author(s):	Raful Pandya-Lorch, IFPRI Susan Minae, FAO
Media format:	PDF
Size:	Three presentations: 1. 45 pages (800 KB) 2. 21 pages (500 KB) 3. 38 pages (150 KB)
Contents:	The module will consist of three parts: 1. The global food situation 2. Achieving food security in Sub-Saharan Africa 3. Agricultural development in Sub-Saharan Africa
Learning objectives:	After completing this module, students should know the following: 1. Key statistics on food security in developing countries 2. Driving forces influencing prospects for food security 3. Priority areas for actions to improve food security 4. Trends in agricultural production 5. Micro- and macro-level constraints on food security 6. Recent developments in agricultural policy
Time schedule:	Required time: 10 study hours
Learning resources:	PDF presentations Course readings, pp. 1–20 Articles X and Y (from your course folder)
Assessment:	Interactive questionnaire and quiz after the module

Module 2: Globalization and Food Security

Module 3: Nutrition and Agriculture

Module 4: …

Appendix D: Example of Course Outline for Natural Resource Management

Course Title:

Natural Resource Management

This course outline is based primarily on assumptions rather than on a real course.

Course outline

Course duration:	15 weeks (September 2005 to February 2006)
Study time:	90 study hours in total, on average 6 hours per week
Course is offered by:	Sokoine University of Agriculture, Morogoro, Tanzania
Course phases:	Phase 1: Course preparation: Test accessibility, media competence, and postage of CD-ROMs (July to August 2005) Phase 2: 15 course weeks Phase 3: Field trip (3 days in December 2005) Phase 4: Delivery of course results and course test (February 2006)
Registration:	Please fill in the registration form on the course website. If you cannot access the website, please send an e-mail to registration@go-afu.com or contact the course facilitator.
Schedule of material delivery:	The training material on CD-ROM and a folder with all readings will be sent to you by post before the commencement of the course. Instructional materials will be sent to you via e-mail every Monday during the training period. If you do not have e-mail access, please contact the course facilitator.
Language:	English
Fee:	The cost for this course is US$200. This includes print and CD-ROM training materials and tutoring time. Participants are responsible for their technology costs and for the travel and room and board costs for the field trip.
Who the course is for:	This course is for • master's students in agricultural economics and agribusiness, • PhD students in agriculture, and • professionals working in the field of food and agricultural policy.
Course objectives:	The objectives of the course are • to investigate the major issues involved in natural resource and environmental management in national and international contexts, • to develop an integrated approach to the analysis and management of natural resource and environmental problems, • to appreciate the relevance of an integrated approach through a consideration of selected issues and problems in natural resource and environmental problems, and • to obtain sufficient skills to use GIS for providing management-relevant information about natural resources and environmental issues.
Course content:	The content of the course will include the following: 1. A Framework for Natural Resource Management • NRM Systems: Resources, Stakeholders, and Institutions • Property Institutions and NRM

	• Regulatory Institutions and NRM • Market Institutions and NRM • Community Institutions and NRM • Knowledge Institutions and NRM 2. Issues and Case Studies in Natural Resource Management • Forest Management • Water Resource Management • Management of Genetic Resources • Rangeland Management • Agricultural Land Management 3. Geographic Information Systems (GIS) in NRM • GIS, Decision-Support Systems, Expert Systems, and Multi-Criteria Evaluation • Environmental Information: Decision-Making Contexts, Networks, and Impacts
Prerequisites:	In order to participate in this course you must be able to • access the Internet from a PC, • write basic documents in English, • navigate a website using hypertext links, • fill in and submit web forms, • send and reply to e-mail messages, and • attend the field trip. Furthermore, you must be enrolled as a master's or PhD student at the university, and you should have basic knowledge of development economics. If you are a professional, please register and pay the course tuition fee. A letter of interest for this course, specifying your knowledge and experience in agricultural economics, is required.
Course literature:	There is no prescribed text for the course. The books, journals, and websites that are useful for particular topics will be announced before the start of the course.
Places available:	30
How you will learn:	You will not feel like you are reading a textbook from a computer screen. The course will make use of various media. You can discuss the course, ask questions, and get support through the course mailing list from your facilitator and the other students. Furthermore, you will meet the other students and your course instructor on the field trip.
What this course requires from you:	If you are new to self-directed learning, you may find this style of learning innovative—and a bit frightening. You can set your own pace; no one will nag you or criticize you for not participating in a class. You learn by participating actively. You alone are responsible for your own learning. That means you must have the drive and discipline to learn throughout the course and to manage the course assessments and the exam.
Time required:	You can take this course at your own pace, but completing it will require 6 hours of study every week. It is recommended that you interact with other learners and the facilitators. After you study the material, please attempt to complete each module immediately in order to improve your study efficiency.
Technical requirements:	This course will run on most operating systems (e.g., Windows 95, 98, NT, 2000, XP, or Linux). It requires the equivalent of a 200 MHz Pentium PC with 128 megabytes of memory. It runs in either Netscape or Internet Explorer, version 4.0 or later. It requires no

	plug-ins, but to view and print the study lettersyou will need the Adobe Acrobat Reader (at least version 3.0—you can download it from http://www.adobe.com). You should also have MS Word or another word-processing program.
To get the most out of this course:	Do the weekly course work at the end of each module. The assignments do not take long and they let you practice what you have learned. Review the readings after you complete the module. Do the case study, which will show how you can apply the readings. Participate in the discussion groups. Ask questions, debate issues, and help others.
Course assessment:	After 8 weeks, students must submit (via e-mail) a case study. The assignments will be given out 4 weeks prior to the due date. A final exam will take place at the end of February. Students will have to come to the local campus to take the exam. The case study will contribute 30% to the final grade, and the final exam 70%. You will need at least a D to pass the course and earn credits.
Credits:	Successful participants will be awarded a Global University for Food and Agriculture (GO-AFU) certificate. Students can also get 3 credits for this course for their study program (master's or PhD).
Bonus:	After successfully finishing the course, you will become a GO-AFU alumnus.
Before you start:	You need to make sure that you have registered for the course and have received the course CD. Please review the prerequisites and the list of technical requirements to make sure that you meet them.
Course author(s):	This course was developed by IFPRI in cooperation with the University of Nature (and the University of Management for the field trip).
Course facilitator:	Your course facilitator will be: Prof. Friendly Help Tel.: 1234567890 E-mail: go-afu@friendlyhelp.com
Other support:	If you have any technical difficulties with the course material, please contact: Technical Help Desk E-mail: help-desk@go-afu.com
URL:	http://ifpri.com/go-afu/globalizationandfoodsecurity http://…
Other information:	We wish you a successful learning experience and a pleasant collaboration with your course facilitator!

Appendix E: The Phases of Distance Learning Material Production

Example: Master's course between 90 and 100 course hours)