

Module Handbook

Watershed Management

REG



By:

AMBAR KUSUMANDARI, HATMA SURYATMODJO

**Master of Forest Science Program
Faculty of Forestry
UNIVERSITAS GADJAH MADA
2021**

SEMESTER LEARNING PLAN

A. Identitas Matakuliah / Course Detail

1. Nama Matakuliah : Watershed Management
2. Kode/SKS/Sifat/Code : KTK 610/2/Pilihan (Elective)
/Credits/Status
3. Prasyarat/Prerequisite : -
4. Deskripsi Singkat/Short Description : Mengkaji tentang: Ruang lingkup Daerah Aliran Sungai (DAS), Sistem kerja DAS, Pendekatan dalam pengelolaan DAS, Teknikteknik pengelolaan air dan pengelolaan tanah di dalam DAS, serta Contoh kasus dalam pengelolaan DAS. Mahasiswa diharapkan memiliki pengetahuan tentang Daerah Aliran Sungai mulai dari konsep Batasan DAS yang didasari pada pemahaman lingkungan sebagai paradigma pembangunan, sumber-sumber pencemaran di DAS, proses-proses yang bekerja di dalam system DAS, dampak yang ditimbulkan, analisisnya, pengelolaan dari dampak, mitigasi dampak yang dapat dilakukan, hingga pengelolaan yang dapat dilakukan untuk melestarikan DAS dari awal agar tidak terjadi kerusakan lingkungan

Reviewing: Scope of watershed, watershed work system, approach to watershed management, techniques of water management and soil management in watersheds, as well as examples of cases in watershed management. Students are expected to have knowledge of watersheds starting from the concept of watershed boundaries based on an understanding of the environment as a development paradigm, sources of pollution in watersheds, processes that work within the watershed system, impacts, their analysis, management of impacts, mitigation the impact that can be done, to the management that can be done to preserve the watershed from the beginning so that environmental damage does not occur.

5. Tujuan Pembelajaran/
Learning Objective : Mampu menjelaskan DAS sebagai suatu kesatuan ekosistem dan hidrologi serta ruang lingkup kajian pengelolaannya. Mampu menunjukkan batas wilayah suatu DAS dan perhitungan empiris terkait DAS dengan metode yang tepat Mampu memahami jenis-jenis permasalahan pada skala DAS dan strategi pengelolaannya dan mampu mengidentifikasi permasalahan pada skala DAS dan melakukan analisis penyelesaian permasalahan. Mengidentifikasi permasalahan terkini dalam suatu DAS dan melakukan analisis penyelesaian permasalahan dalam pemahaman lingkungan sebagai paradigma pembangunan dan mampu menentukan strategi pengelolaan DAS secara berkelanjutan dalam rangka menjaga fungsi ekologi dan fungsi ekonomi DAS sebagai paradigma pembangunan.

Students are able to explain watershed as an ecosystem and hydrology unit as well as the scope of management studies. Students are able to show the boundaries of a watershed and empirical calculations related to watersheds with the right method. Students are able to understand the types of problems at the watershed scale and their management strategies and able to identify problems at the watershed scale and perform problem-solving analysis. Students are able to identify problems in a watershed and analyzing problem-solving in the environment as a development paradigm and

able to determine a sustainable watershed management strategy in order to maintain the ecological and economic functions of the watershed as a development paradigm

6. Dosen Pengampu : AMBAR KUSUMANDARI, HATMA SURYATMODJO
Matakuliah/*Lecturers*
7. Capaian Pembelajaran :
Matakuliah/*Course*
Learning Outcome
(CPMK/CLO)

Kode / Code	Deskripsi / Description	PLO/SO/ELO/CPL/LG
CPMK3	Mahasiswa mampu mengidentifikasi permasalahan pada skala DAS dan melakukan analisis penyelesaian permasalahan. Students are able to understand the types of problems at the watershed scale and their management strategies and able to identify problems at the watershed scale and perform problem solving analysis.	PLO1, PLO 4
CPMK4	Mahasiswa mampu menentukan strategi pengelolaan DAS secara berkelanjutan dalam rangka menjaga fungsi ekologi dan fungsi ekonomi DAS sebagai paradigma pembangunan Students are able to Identifying problems in a watershed and analyzing problem solving in the environment as a development paradigm and able to determine a sustainable watershed management strategy in order to maintain the ecological and economic functions of the watershed as a development paradigm	PLO1, PLO 6

PLO / PI Detail

PLO1	Values and Principles	possess a set of universal and fundamental values and principles: universal ethics, patriotism and world peace, social and environmental sensitivity, pluralism and fair play, and rule of law.
PLO 5	Knowledge (Analyse Comprehensively in the Specific Fields)	<i>Able to analyze comprehensively updated issues in the specific fields of silviculture, forest management, forest products technology or forest resource conservation, and to recommend possible solutions based on defined problems.</i>
PLO 3	Knowledge (Theory, Philosophy, and Natural Resources)	<i>Able to compare and criticize the theory, philosophy, and design of sustainable development of forest and natural resources, considering the complexity of global issues.</i>
PLO 4	Knowledge (Critique science, Knowledge, Technology and Art of Forestry)	Able to connect and critique science, knowledge, technology and art of forestry based on ecosystem and landscape, covering silviculture, forest management, forest products technology and natural resource conservation.
PLO 6	Skill (Logic, Critical, Innovative Thinking)	<i>Able to apply logical, critical, systematic and innovative thinking skills by utilizing information technology to produce solutions in form of scientific documents individually as well as in a team.</i>

B. Topik Perkuliahan / Course

<i>Materials</i> Bahasan / Main Discussion	Estimasi Waktu / <i>Estimated Times</i> (Hour)	Kompetensi (Course Learning Outcomes)
Pendahuluan dan Konsep DAS Watershed Introduction and Concept	2	CPMK 1
Pemahaman tentang batas DAS. Watershed boundaries.	2	CPMK 2
Pembahasan morfometri DAS Watershed morphometry.	2	CPMK 2
Dasar-dasar pengelolaan DAS Basics of watershed management	2	CPMK 3
Pembangunan Berkelanjutan Berbasis Ekosistem DAS Sustainable Development Based on Watershed Ecosystems	2	CPMK 4
Pertumbuhan Ekonomi sebagai Tolak Ukur Pembangunan Berkelanjutan Economic Growth as a Benchmark for Sustainable Development	2	CPMK 4
Permasalahan Lingkungan terkait DAS Environmental problems related to watershed	4	CPMK 3
Strategi Teknis Pengelolaan Management Technical Strategy	2	CPMK 4
Pembagian Zonasi DAS Watershed Zoning Division	2	CPMK 2

C. Rencana Asesmen / Assessment Plan

CO/CPMK	Tipe / Type	Deskripsi / Description	Persentase / Percentage	PLO/SO/ELO/CPL/LG
CPMK1	UTS/ MIDTERM EXAM	Soal/Questions	10	PLO 5
CPMK1	TUGAS/ ASSIGNMENT	Tugas/Assignment	5	PLO 5
CPMK2	UTS/ MIDTERM EXAM	Soal/Questions	10	PLO 3
CPMK2	TUGAS/ ASSIGNMENT	Tugas/Assignment	5	PLO 3
CPMK3	UAS/ FINAL EXAM	Soal/Questions	15	PLO 4
CPMK3	DISKUSI/ DISCUSSION	Paper	20	PLO 4
CPMK4	UAS/ FINAL EXAM	Soal/Questions	15	PLO 6
CPMK4	DISKUSI/ DISCUSSION	Paper	20	PLO 6

D. Referensi / References

1. Arsyad, S., Amien, I., Sheng, T., and moldnhauer, W. (ed), 1992. Conservation policies forsustainable hillslope farming. Soil and Water Conservation Society, Ankey, Iowa, USA
2. Banskota, M. and Sharma, P (ed)., 1993. Development of poor mountain areas.ICIMOD (International Center for Integrated Mountain Development).Kathmandu, Nepal.
3. Fao,1986. Strategies, approaches, and systems in integrated watershed management. FAOConversation Guide 14, Rome.
4. __, 1986. Guidelines for watershed management. Forest Resources Division, FAO ForestryDepartment, Rome.
5. __, 1986. FAO watershed management field manual: Vegetative and Soil treatment measures.Conservation Guide 13, Rome.
6. __, 1986. Guidelines for economic appraisal of watershed management projects. FAO Conservation Guide 6, Rome.Panduan PSIK S2 46
7. __, 1986. Incentives for community involvement in conservation programs. FAO ConservationGuide 12, Rome.
8. ICIMOD (International Center for Integrated Mountain Development, 1993. Mountain Environment and Development.
9. Lal, R. and Russell, E.W (ed), 1981. Tropical Agricultural Hydrology. watershed management andLand Use. John Wiley & Sons.
10. Asdak, C. 2010. Hidrologidan Pengelolaan Daerah Aliran Sungai. Yogyakarta: Gadjah Mada University Press.

E. Rencana Kegiatan Pembelajaran Mingguan (RKPM) / Weekly Teaching Plan

Pertemuan / Week	Tujuan Ajar / Learning Objective	Topik / Topic	Media Ajar / Teaching Media	Metode Assesment / Assesment Method	Metode Ajar / Teaching Method	Aktivitas Mahasiswa / Student Activity	Aktivitas Dosen / Lecturer Activity	Sumber Ajar / Learning Resources
1.	Mahasiswa mampu memahami DAS sebagai kesatuan ekosistem sebagai bentanglahan dan sebagai sistem hidrologi. Students are able to understand watersheds as a unified ecosystem as a landscape and as a hydrological system.	Pendahuluan dan KonsepDAS. Watershed Introduction andConcept	Cisco Webex Zoom Google Meet Elok Google Classroom	UTS Mid-term	Kelompok diskusi, kuliah, demonstrasi. Discussion group, lecture, demonstration	Membaca paper dan jurnal, diskusi, menyiapkan PPT. Reading paper and journal, discussion, preparing PPT	Mengajar, mempersiapkan referensi. Lecturer, preparing reference	

Pertemuan / Week	Tujuan Ajar / Learning Objective	Topik / Topic	Media Ajar / Teaching Media	Metode Assesment / Assesment Method	Metode Ajar / Teaching Method	Aktivitas Mahasiswa / Student Activity	Aktivitas Dosen / Lecturer Activity	Sumber Ajar / Learning Resources
2.	Mahasiswa mampu menganalisa dan menetapkan batas DAS dan sub-DAS Students are able to analyze and determine the boundaries of watersheds and sub-watersheds.	Penentuan Batas DAS dan sub-DAS. Determination of watershed and sub-watershed boundaries.	Cisco Webex Zoom Google Meet Elok Google Classroom	UTS Tugas Individu: mendefinisikan batas DAS dan Sub-DAS. Mid-term Individual Assignment: defining watershed and sub-watershed boundaries.	Kelompok diskusi, kuliah, demonstrasi. Discussion group, lecture, demonstration,	Membaca paper dan jurnal, diskusi, menyiapkan PPT. Reading paper and journal, discussion, preparing PPT	Mengajar, mempersiapkan referensi. Lecturer, preparing reference	
3.	Mahasiswa mampu menganalisa dan menetapkan batas dan bentuk DAS dan sub-DAS dengan metode morfometri dan orde sungai. Students are able to analyze and determine the boundaries and shapes of watersheds and sub watersheds using morphometric methods and river orders.	Morfometri DAS dan Orde Sungai. Watershed Morphometry and River Order.	Cisco Webex Zoom Google Meet Elok Google Classroom	UTS Tugas Individu: menentukan bentuk DAS berdasarkan morfometri. Mid-term Individual Assignment: determining the shape of the watershed based on morphometry.	Kelompok diskusi, kuliah, demonstrasi. Discussion group, lecture, demonstration,	Membaca paper dan jurnal, diskusi, menyiapkan PPT. Reading paper and journal, discussion, preparing PPT	Mengajar, mempersiapkan referensi. Lecturer, preparing reference	
4.	Mahasiswa mampu memahami kerangka dasar pengelolaan DAS dalam pemahaman lingkungan sebagai paradigma pembangunan. Students are able to understand the basic framework of watershed management in understanding the environment as a development paradigm.	Dasar-dasar Pengelolaan DAS. Fundamentals of Watershed Management.	Cisco Webex Zoom Google Meet Elok Google Classroom	UTS Tugas Individual: mengulas kondisi dari DAS. Mid-term Individual Assignment: review the condition of a watershed.	Kelompok diskusi, kuliah, demonstrasi. Discussion group, lecture, demonstration,	Membaca paper dan jurnal, diskusi, menyiapkan PPT. Reading paper and journal, discussion, preparing PPT	Mengajar, mempersiapkan referensi. Lecturer, preparing reference	
5.	Mahasiswa mampu menjelaskan konsep pembangunan berkelanjutan suatu DAS dengan dasar pemahaman kesatuan ekosistem. Students are able to explain the concept of sustainable development of a watershed based on an understanding of ecosystem unity.	Pembangunan Berkelanjutan berbasis Ekosistem DAS. Watershed Ecosystem-based Sustainable Development	Cisco Webex Zoom Google Meet Elok Google Classroom	UTS Mid-term	Kelompok diskusi, kuliah, demonstrasi. Discussion group, lecture, demonstration,	Membaca paper dan jurnal, diskusi, menyiapkan PPT. Reading paper and journal, discussion, preparing PPT	Mengajar, mempersiapkan referensi. Lecturer, preparing reference	

Pertemuan / Week	Tujuan Ajar / Learning Objective	Topik / Topic	Media Ajar / Teaching Media	Metode Assesment / Assesment Method	Metode Ajar / Teaching Method	Aktivitas Mahasiswa / Student Activity	Aktivitas Dosen / Lecturer Activity	Sumber Ajar / Learning Resources
6.	Mahasiswa mampu menjelaskan konsep pertumbuhan ekonomi dalam paradigma pembangunan berkelanjutan. Students are able to explain the concept of economic growth in the paradigm of sustainable development.	Pertumbuhan Ekonomi sebagai Tolak Ukur Pembangunan Berkelanjutan. Economic Growth as a Benchmark of Sustainable Development.	Cisco Webex Zoom Google Meet Elok Google Classroom	UAS The final exams.	Kelompok diskusi, kuliah, demonstrasi. Discussion group, lecture, demonstration,	Membaca paper dan jurnal, diskusi, menyiapkan PPT. Reading paper and journal, discussion, preparing PPT	Mengajar, mempersiapkan referensi. Lecturer, preparing reference	
7.	Mahasiswa mampu memahami dan setiap permasalahan yang timbul dalam lingkup DAS. Students are able to understand and any problems that arise within the watershed.	Permasalahan Lingkungan terkait DAS: - Erosi - Longsor - Sedimentasi - Pencemaran - Banjir bandang - Genangan Watershed-related Environmental Issues: - Erosion - Avalanche - Sedimentation - Pollution - Flash floods - Puddle	Cisco Webex Zoom Google Meet Elok Google Classroom	UAS Tugas Kelompok The final Group Assignment.	Kelompok diskusi, kuliah, demonstrasi. Discussion group, lecture, demonstration,	Membaca paper dan jurnal, diskusi, menyiapkan PPT. Reading paper and journal, discussion, preparing PPT	Mengajar, mempersiapkan referensi. Lecturer, preparing reference	
8	Mahasiswa mampu memahami dan setiap permasalahan yang timbul dalam lingkup DAS. Students are able to understand and any problems that arise within the watershed.	Permasalahan Lingkungan terkait DAS: - Erosi - Longsor - Sedimentasi - Pencemaran - Banjir bandang - Genangan Watershed-related Environmental Issues: - Erosion - Avalanche - Sedimentation - Pollution - Flash floods - Puddle	Cisco Webex Zoom Google Meet Elok Google Classroom	UAS Tugas kelompok The final exams Group Assignment	Kelompok diskusi, kuliah, demonstrasi Discussion group, lecture, demonstration	Membaca paper dan jurnal, diskusi, menyiapkan PPT Reading paper and journal, discussion, preparing PPT	Mengajar, mempersiapkan referensi. Lecturer, preparing reference	
9	Mahasiswa mampu menganalisa strategi pengelolaan DAS dalam pemahaman lingkungan sebagai paradigma pembangunan. Students are able to analyze watershed management strategies in understanding the environment development paradigm.	Strategi Pengelolaan - Teknis pelaksanaan - Operasionalisasi pengelolaan Management Strategy- Technical implementation Operationalization of management	Cisco Webex Zoom Google Meet Elok Google Classroom	UAS The final exams	Kelompok diskusi, kuliah, demonstrasi. Discussion group, lecture, demonstration,	Membaca paper dan jurnal, diskusi, menyiapkan PPT. Reading paper and journal, discussion, preparing PPT	Mengajar, mempersiapkan referensi. Lecturer, preparing reference	

Pertemuan / Week	Tujuan Ajar / Learning Objective	Topik / Topic	Media Ajar / Teaching Media	Metode Assesment / Assesment Method	Metode Ajar / Teaching Method	Aktivitas Mahasiswa / Student Activity	Aktivitas Dosen / Lecturer Activity	Sumber Ajar / Learning Resources
10.	Mahasiswa mampu menunjukkan pembagian zona suatu DAS. Students are able to show the zoning of a watershed.	Pembagian zonasi Hulu-Tengah Hilir Sub zonasi sisa erosi dan deposisi. Zoning division Upstream-Middle-Downstream Sub-zoning of erosion and deposition residues.	Cisco Webex Zoom Google Meet Elok Google Classroom	UAS The final exams	Kelompok diskusi, kuliah, demonstrasi. Discussion group, lecture, demonstration,	Membaca paper dan jurnal, diskusi, menyiapkan PPT. Reading paper and journal, discussion, preparing PPT	Mengajar, mempersiapkan referensi. Lecturer, preparing reference	