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# Sustainable Nutrient Management in New Zealand Agriculture

## Intermediate Level Course Outline – Pastoral Option

<b>Controller:</b>	Fertilizer and Lime Research Centre (Massey University)
<b>Availability:</b>	Extramural study plus a three day contact course offered to groups (20-30 persons) as demand dictates
<b>Location:</b>	At Massey University, Palmerston North or at other venues by arrangement.
<b>Delivery mode:</b>	Extramural reading assignment plus a three day contact course

Updated January 2016

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<b>Aim:</b>	To provide students with a working knowledge of the assessment of nutrient requirements of pastoral agricultural systems with consideration of best practices for environmental protection.
<b>Entry requirements:</b>	Participants should have completed at least one tertiary level course in Soil Science or Land Resource Management or have practical/professional experience of a standard acceptable to the course controller.
<b>Course requirement:</b>	Pre-course reading will involve approximately 40 hours of study and completion of a pre-course assignment. Participants must attend all class sessions and pass a two-hour examination on the final day.
<b>Course prescription:</b>	A comprehensive study guide plus a series of lectures and participatory computer aided classes focussing on the knowledge and skills required to achieve a high standard of sustainable nutrient management in the common New Zealand pastoral agricultural systems.

**The Pastoral option includes the following information modules:**

- Farming and Water Quality – Defining the Issue
- Soil Patterns, Landuse and Climate
- Nutrients and Nutrient Cycles
- Diagnostics: Soil and Plant Testing
- Nutrient Transfer to the Aquatic Environment
- Issues with Contaminants in Fertilisers and By-products
- Nutrient Cycles and Nutrient Budgeting
- Overseer<sup>®</sup> Nutrient Budgets
- Complying with the Code of Practice for Nutrient Use and Marketing Requirements

Case Studies are conducted to familiarise participants with:

- *The theory and current practice of determining nutrient and fertiliser recommendations (with extensive use of the Overseer<sup>®</sup> Nutrient Budgets software),*
- *Estimating nutrient losses from agricultural systems and their impacts on the wider environment,*
- *The influences of fertilisers on soil quality,*
- *Indicators used to assess nutrient status in soil, plants, water and atmosphere.*

**Learning outcomes:** The course makes frequent references to the *Resource Management Act, Code of Practice for Nutrient Management and the Fertmark and Spreadmark schemes.*

On completion of the course the participants will:

*Know the theoretical basis on which the current Code of Practice for Nutrient Management is based.*

*Be able to use and interpret the outputs from the decision support software Overseer<sup>®</sup> Nutrient Budgets.*

*Be able to use the knowledge on soil processes, fertiliser technology and the impacts of fertiliser use to critically assess options for sustainable nutrient management in pastoral agricultural systems.*

**Certification:** Successful participants will receive a Massey University ‘Certificate of Completion’ in Sustainable Nutrient Management in New Zealand Agriculture and have their achievement added to the official student records at Massey University.

**Assessment:** A two- hour written examination at the end of the three-day contact course comprises 100% of the course marks.

**Requirements to successfully complete the paper:**

Attend all sessions of the three- day contact course and obtain a minimum of a C grade (> 50% exam mark) in the course examination.

**Learning Programme and Schedule:**

Six weeks prior to the contact course, a comprehensive study guide and instructions are supplied. It is considered appropriate that participants would spend up to 40 hours studying the course notes, completing a pre-course assignment and loading case study information to the Overseer software in order to be prepared for the contact course. The lecture material reinforces learning of key sections of the study guide and allows hands-on experience and explanation of using the nutrient budgeting software on case study information.

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**Credit to other tertiary Qualifications:**

The ‘Certificate of Completion’ is a recognised University achievement. A student may wish to have the work completed on this course (40 hrs private study plus 20 hrs lectures and workshops) credited towards either an undergraduate or postgraduate paper in Soil Science offered by Massey University. This can be achieved by enrolling in the appropriate paper and applying for credit to the course controller for the work completed in this short course. Further details can be solicited from Professor M J Hedley.

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# Intermediate SNM contact course

## *Pastoral Option*

### PROVISIONAL PROGRAMME

#### Day One

Time	Major Topic (Personnel)	Contents Brief
8.30-8.45	Welcome to the course	<ul style="list-style-type: none"> <li>• <b>Introduction</b> <ul style="list-style-type: none"> <li>○ <i>The tutors and the participants</i></li> <li>○ <i>The course objectives and outline</i></li> </ul> </li> </ul>
8.45-10.00	Soil Patterns , Landuse and Climate	<ul style="list-style-type: none"> <li>• <b>Landscapes, soils and climate</b> <ul style="list-style-type: none"> <li>○ <i>Identifying landscape features</i></li> <li>○ <i>Understanding the origins and properties of soils</i></li> </ul> </li> </ul>
10.00-10.30	Morning Tea	
10.30-12.30	Nutrients and nutrient cycles	<ul style="list-style-type: none"> <li>• <b>N, P, K and S in production systems</b> <ul style="list-style-type: none"> <li>○ <i>Amounts</i></li> <li>○ <i>Forms</i></li> <li>○ <i>Key processes</i></li> <li>○ <i>Acidity</i></li> </ul> </li> </ul>
12.30-1.30	Lunch	
1.30-2.30	Diagnostics	<ul style="list-style-type: none"> <li>• <b>Understanding soil and plant tests</b> <ul style="list-style-type: none"> <li>○ <i>Optimum level indicators</i></li> <li>○ <i>Soil and plant testing protocols</i></li> </ul> </li> </ul>
2.30-3.15	Water movement through agricultural landscapes	<ul style="list-style-type: none"> <li>• <b>Transport pathways</b> <ul style="list-style-type: none"> <li>○ <i>Importance of soil properties</i></li> <li>○ <i>Diffuse and point sources</i></li> </ul> </li> </ul>
3.15-3.45	Afternoon Tea	
3.45-4.15	<i>.....continued</i>	<p style="text-align: center;"><i>.....continued</i></p> <ul style="list-style-type: none"> <li>○ <i>Methods of measuring</i></li> <li>○ <i>Understanding the units</i></li> </ul>
4.15-5.15	Farming and Water Quality	<ul style="list-style-type: none"> <li>• <b>Nutrient transfer to the aquatic environment</b> <ul style="list-style-type: none"> <li>○ <i>Amounts and forms of nutrients</i></li> <li>○ <i>Water quality</i></li> <li>○ <i>Legislative and regulatory framework</i></li> <li>○ <i>The role of Regional Councils</i></li> </ul> </li> </ul>

## Day Two

8.30-8.40	Tutorial	<ul style="list-style-type: none"> <li>• Exam format and technique</li> </ul>
8.40-9.45	Issues with contaminants	<ul style="list-style-type: none"> <li>• Cadmium and Fluoride               <ul style="list-style-type: none"> <li>○ Fertiliser management strategy for cadmium</li> <li>○ Management of fluoride</li> </ul> </li> </ul>
9.45-10.30	The science behind Overseer	<ul style="list-style-type: none"> <li>• Linking nutrient cycles and nutrient budgeting               <ul style="list-style-type: none"> <li>○ Managing soil productivity on dairy farms</li> <li>○ Gains and losses in the N, P, K and S cycles</li> <li>○ Estimating nutrient requirements</li> </ul> </li> </ul>
10.30-11.00	Morning Tea	
11.00-12.00	Using Overseer	<ul style="list-style-type: none"> <li>• Key considerations and assumptions</li> </ul>
12.00-1.00	Lunch	
1.00-2.45	Nutrient management with Overseer	<ul style="list-style-type: none"> <li>• Practical use of Overseer               <ul style="list-style-type: none"> <li>○ The Overseer interface and inputs</li> <li>○ Nutrient budgets</li> <li>○ Developing fertiliser recommendations</li> </ul> </li> </ul>
2.45-3.15	Afternoon Tea	
3.15-5.15	Case Studies	<ul style="list-style-type: none"> <li>• Nutrient budgeting exercise               <ul style="list-style-type: none"> <li>○ Identifying environmental risks</li> <li>○ Complying with the Code of Practice for Nutrient Management</li> </ul> </li> </ul>

## Day Three

8.30-10.00	Case Studies	<ul style="list-style-type: none"> <li>• Report back from group exercise               <ul style="list-style-type: none"> <li>○ Comparing different approaches</li> </ul> </li> </ul>
10.00-10.30	Morning Tea	
10.30-11.00	Review	<ul style="list-style-type: none"> <li>• Theory and practice               <ul style="list-style-type: none"> <li>○ Question time</li> </ul> </li> </ul>
1100-1200	Free Time	
12.00-12.45	Lunch	
12.45-3.00	Assessment	<ul style="list-style-type: none"> <li>• 2 hour examination               <ul style="list-style-type: none"> <li>○ Case study material (50%)</li> <li>○ Study guide and lecture material (50%)</li> </ul> </li> </ul>