

IV Year I - Semester

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## AG413 Mechanics of Tillage and Traction

### Course Description & Objectives:

To present an overview of tillage and traction devices and systems to the students. To present fundamental concepts describing dynamic soil behavior in response to mechanical elements with methods for designing traction/transport systems.

### Course Outcomes:

After the completion of this course the student will be:

1. able to measure and utilize physical and mechanical properties of soil.
2. Able to interpret and predict soil stress strain behavior.
3. able to design and implement safe and cost effective mechanical soil tillage systems
4. able to design and implement and cost effective mechanical traction/transport systems
5. able to establish systems that produce specified performance and acceptable alteration of affected soil profiles.

### Unit 1: Mechanics of Tillage:

Introduction to mechanics of tillage tools, engineering properties of soil, principles and concepts, stress strain relationship,

### Unit II: Design of Tillage Tools:

Design of tillage tools principles of soil cutting, design equation, force analysis, application of dimensional analysis in soil dynamics performance of tillage tools.

### Unit III: Traction and Mechanics:

Introduction to traction and mechanics, off road traction and mobility, traction model, traction improvement, traction prediction,

### Unit IV: Introduction of Tyre:

Tyre size, tyre lug geometry and their effects, tyre testing, soil compaction and plant growth,

### Unit V: Application of GIS in Agriculture Machinery:

Variability and geo statistic, application of GIS in soil dynamics.

**TEXT BOOKS:**

1. Mc Kyes.E. (1989). *Agricultural engineering soil mechanics*. Elsevier Amsterdam.
2. Milligan, (1989).G.M.E and Houlby, G.T. *Basic Soil mechanics*., Butter worth scientific London.

**REFERENCES:**

1. Mc Kyes.E. (1990).*Soil Cutting*. Elsevier Amsterdam.
2. William Lambe.T.Whiteman and Robert.V. (1995).*Soil Mechanics*. Wiley Eastern Ltd., New Delhi.
3. [http://ecourses.iasri.res.in/e-Leaarningdownload3\\_new.aspx?Degree\\_Id=04](http://ecourses.iasri.res.in/e-Leaarningdownload3_new.aspx?Degree_Id=04)
4. <http://www.elsevier.com/books/soil-cutting-and-tillage/mckyes/978-0-444-42548-5>
5. [http://bseerv214.bse.vt.edu/grisso/ethiopia/books\\_resources/tillage/soildyn\\_table-of-contents.pdf](http://bseerv214.bse.vt.edu/grisso/ethiopia/books_resources/tillage/soildyn_table-of-contents.pdf)