

Anthropological Sciences 173: Diet, Nutrition, and Human Growth

Instructor: [James Holland Jones](#)

January 6, 2004

1 Course Description

All animals need to acquire energy and other essential resources from their environments, and humans are no exception. In this course, we will consider human nutritional requirements, the physiological processes that mediate intake, absorption, and use, and the constraints placed upon human biology by the distribution of resources in the environment.

This course is simultaneously ecological and evolutionary. That is, it considers both the distribution and abundance of resources and the history and adaptive value of traits and relationships.

We will explore to a large extent the ecology of nutrient distribution in the developed industrial world and its consequences for an omnivorous primate adapted to fluctuating environments (i.e., us!).

2 Readings

We will use three texts:

1. Tanner, J.F. 1990. *Foetus into man*, 2nd ed. Cambridge: Harvard University Press.
2. Ungar, P.S and M.F. Teaford, eds. 2002. *Human diet: Its origin and evolution*. New York: Bergin & Garvey.
3. Brownell, K.D. and K.B. Horgen. 2004. *Food fight: The inside story of the food industry, America's obesity crisis, and what we can do about it*. New York: Contemporary Books.

These texts will be supplemented extensively by readings from the primary literature. For the most part, the reading load of this class is moderate. You can expect to read 2-3 chapters from a book and about two journal articles each week.

Readings will be placed on reserve at the Falconer Biology Library.

I will provide URLs to all course-related readings from the primary literature which are available online to the Stanford community. I will also make every effort to provide electronic copies of those primary literature readings which are not available in native electronic format via coursework.

2.1 About This Syllabus

This syllabus is designed to be used both in both printed and online forms. Many of the weekly readings will have internet links directly through this document. If you use MacOS, I suggest that you view this document using the [Adobe Acrobat Reader](#), and not *Preview*, which is often set to be the default pdf reader under OS X.

3 Assignments

There will be four (4) homework assignments spread out over the quarter. These include: (1) dietary recall, (2) plotting and analysis of growth data, (3) measurement of food distribution, and (4) a brief critique of a reducing diet.

Each assignment will be relatively brief (2-3 pages of writing), and all but the last will be discrete (i.e., problem-set like) tasks. Specific details about each assignment will be provided in the weeks that they are assigned.

4 Grading

The breakdown of grading for this class will be as follows:

40% Each one of the four assignments will count as 10% of your grade for the course, totaling 40%.

20% Midterm exam. Midterm will be in-class on Thursday, 12 February.

40% Cumulative final exam.

Homework assignments are due at the start of class on the Thursday of the week they are due. Late assignments will lose one third of a grade each day following the due date.

Make-up exams will be granted *only in unusual circumstances*, and only when appropriately documented as legitimate (e.g., by a doctor, residence dean, etc.).

5 Syllabus

Week 1. 6 January: Background: Human Evolutionary Ecology

1. Life History Theory
2. What Is Ecology?
3. The Comparative Perspective
4. Scaling
5. Is Evolution Useful?

Readings: [Armstrong \(1987\)](#), [Mann and Truswell \(2002, ch.2 & 3\)](#), [Willmer et al. \(2000, ch. 1\)](#)

Recommended: [Willmer et al. \(2000, ch. 1-2\)](#)

Week 2. 13 January: The Building Blocks: Nutritional Components of the Human Diet

1. Energy and Macronutrients
2. Micronutrients
3. Antifeedants
4. Dispersal Syndromes

Readings: [Mann and Truswell \(2002, chapters 4 & 5\)](#), [Hladik and Chivers \(1994\)](#), [Chivers and Langer \(1994\)](#)

Recommended: [Jackson \(1991\)](#)

Week 3. 20 January: Metabolic Physiology

1. Hormones and the Organization of the Neuroendocrine System
2. Energy, Protein, and Lipid Metabolism

Assignment: 24-hour Food Recall

Readings: [Vander et al. \(2001, ch. 17 & 18\)](#), [Diamond \(2003\)](#),

Week 4. 27 January: Human Growth I: Process

Readings: [Tanner \(1990, ch. 1-6\)](#), [Schroeder et al. \(1995\)](#), [Brown and Pollitt \(1996\)](#), [Leigh \(1996\)](#)

Week 5. 3 February: Human Growth II: Measurement

1. Growth Standards
2. Stunting, Wasting, and Catch-Up Growth

Assignment: Plotting Growth Curves

Readings: [Tanner \(1990, ch. 7-12\)](#), [Suskind et al. \(2001\)](#), [Martorell et al. \(1994\)](#)

Week 6. 10 February: Growth and Maturation

Assignment: Midterm Exam, Thursday, 12 February

Readings: [Ellison \(1981\)](#), [Prentice and Whitehead \(1987\)](#)

Week 7. 17 February: Ecology of Food Distribution

1. Trophic Flows
2. Phenology

3. Jarman-Bell

Readings: [Van Schaik et al. \(1993\)](#), [Wrangham et al. \(1999\)](#), [Ungar and Teaford \(2002, ch. 6-7\)](#)

Week 8. 24 February: Economies of Food Extraction

1. Foraging
2. Horticulture
3. Agriculture
4. Industrial and Post-Industrial Economies

Assignment: Distributional Ecology

Readings: [Ungar and Teaford \(2002, ch 3-6\)](#)

Week 9. 2 March: Ecology and Epidemiology

1. Malnutrition
2. Obesity

Assignment: Critique of reduction diet

Readings: Start [Brownell and Horgen \(2004\)](#)

Week 10. 9 March Thoughts on Diet and Health

Readings: Finish [Brownell and Horgen \(2004\)](#), [Ungar and Teaford \(2002, ch. 8\)](#)

References

- Armelagos, G. J. (1987). Biocultural aspects of food choice. In M. Harris and E. Ross (Eds.), *Food and evolution: Toward a theory of human food habits*, pp. 579–594. Philadelphia: Temple University Press.
- Brown, J. L. and R. Pollitt (1996). Malnutrition, poverty, and intellectual development. *Scientific American* 1996, 38–43.
- Brownell, K. D. and K. B. Horgen (2004). *Food fight: The inside story of the food industry, America's obesity crisis, and what we can do about it*. Chicago: Contemporary Books.
- Chivers, D. J. and P. Langer (1994). Food, form and function: Interrelationships and future needs. In D. Chivers and P. Langer (Eds.), *The digestive system in mammals: Food, form, and function*, pp. 411–430. Cambridge: Cambridge University Press.
- Diamond, J. M. (2003). [The double puzzle of diabetes](#). *Nature* 423, 599–602.

- Ellison, P. T. (1981). Threshold hypotheses, developmental age, and menstrual function. *American Journal of Physical Anthropology* 54(3), 337–340.
- Hladik, C. M. and D. J. Chivers (1994). Foods and the digestive system. In D. Chivers and P. Langer (Eds.), *The digestive system in mammals: Food, form, and function*, pp. 65–73. Cambridge: Cambridge University Press.
- Jackson, F. L. C. (1991). [Secondary compounds in plants \(allelochemicals\) as promoters of human biological variability](#). *Annual Review of Anthropology* 20, 505–546.
- Leigh, S. R. (1996). Evolution of human growth spurts. *American Journal of Physical Anthropology* 101, 455–474.
- Mann, J. and S. Truswell (Eds.) (2002). *Essentials of human nutrition*. Oxford: Oxford University Press.
- Martorell, R., L. Khan, and D. Schroeder (1994). Reversibility of stunting: Epidemiologic findings in children from developing countries. *European Journal of Clinical Nutrition* 48, S 45–S 57.
- Prentice, A. M. and R. G. Whitehead (1987). The energetics of human reproduction. *Zoological Society of London Symposia* 57, 275–304.
- Schroeder, D., R. Martorell, J. Rivera, M. Ruel, and J. Habicht (1995). Age-differences in the impact of nutritional supplementation on growth. *Journal of Nutrition* 125(4), S1051–S1059.
- Suskind, R. M., L. Lewinter-Suskind, K. K. Murthy, D. Suskind, D. Suskind, and D. Liu (2001). The malnourished child: An overview. In R. Suskind and K. Tontisirin (Eds.), *Nutrition, Immunity, and Infection in Infants and Children*, pp. 23–43. Philadelphia: Lippincott, Williams and Wilkins.
- Tanner, J. M. (1990). *Fetus into man: Physical growth from conception to maturity*. Cambridge: Harvard University Press.
- Ungar, P. S. and M. F. Teaford (Eds.) (2002). *Human diet: Its origin and evolution*. Westport, CT: Bergin & Garvey.
- Van Schaik, C. P., J. W. Terborgh, and S. J. Wright (1993). The phenology of tropical forests: Adaptive significance and consequences for primary consumers. *Annual Review of Ecology and Systematics* 24, 353–377.
- Vander, A. J., J. H. Sherman, and D. S. Luciano (2001). *Human Physiology: The mechanisms of body function*. Boston: McGraw-Hill.
- Willmer, P., G. Stone, and I. Johnston (2000). *Environmental physiology of animals*. Oxford: Blackwell Science.
- Wrangham, R. W., J. H. Jones, G. Laden, D. Pilbeam, and N. Conklin-Brittain (1999). The raw and the stolen: Cooking and the ecology of human origins. *Current Anthropology* 40(5), 567–594.